MODEL AIRPLANE NEWS

MARCH 1950 • 25 CENTS

WHAT ABOUT PROFESSIONALISM?

1949 SPRINGFIELD TROPHY WINNER

By BILL WINTER

HOLD your hats, the "*Box*" is full of "scraps" and we have a long way to go . . .

"Received the latest M.A.N. and, after reading the '*Scrap Box*' am ready to quit modeling," says S. C. Smith, he of the unwanted but glamorous nicknames. Smitty, Cal, Flash, Ace, etc., isn't really mad at the "*Scrap Box*." It's the proposed flying scale rules that have him hopping. Smith, as you know, has produced some nifty flying scale yo-yo's, such as the *Midget Mustang* and AT-6, which fly at least as well as they look. In his book the suggested rules create disturbing olfactory sensations, and bring forth these conclusions.

"The over-all idea is okay," comments the man from Asbury Park, N.J., "but I want to make strong objection to one proposal. A one-inch scale indeed! That does it! As you said, the field narrows to private types (sparks and loud static here). A 36-inch *Cub* won't get off the average flying site, with small wheels right under the C.G. and a long heavy nose. Most yo-yo's are too small and the adoption of such a rule will go a long way towards busting up a lot of fine scale models that a lot of guys spend much time building.

"The way to keep the 'flying' in flying scale is not with 1-inch-equals-the-foot models," declares Smith. "My favorite *Long Midget* would have to be 13 1/2" to compete. At present I am contemplating a 2" scale job because I know I can get better performance out of this size.

"Interest increases in multi-engine so the rules say one-inch scale maximum. This means a 7-foot B-17, an 11-foot B-29—and I doubt that many builders want to go that big. These boys can still make their five-foot B-29 and have a good model within the rules. But what about the great majority of builders that prefer single engine types? Are they to be penalized like this?

". . . it would be difficult to arrange a point schedule fair to all kits. Grading a small portion of points according to the accuracy of the plan to begin with? Wow! I wouldn't want that job.

"If *any scale* rules are retained it will bring out more contestants and those who build little solid (flying) scales will be quickly weeded out performance-wise in any contest."

And from Herb Owbridge. (The Rudevator and control tank man.) "We have long since divorced spark ignition. Too complex, fussy, and heavy. Our latest ship has a 3 1/2-foot span and grosses 25 oz. It has a full complement of radio with no short cuts. Wing loading is about 12 oz. and the engine an .074 *Cub*. Control installation runs about 9 oz. The ship can break props and bounce on its nose without even loosening the engine." We have been discussing with Herb the possibility of using a Rudevator on our next ship. Herb's thinking gets around so we've culled a few of his more significant remarks.

"The old method of engine control is also gone. It (control tank) will give the most engine control for the least weight and complexity. For one electrical part (the check valve), you get proportional power control. It takes a certain amount of skill to get the most out of it in actual practice. This is worth the effort because not only will many get tired of flying with rudder alone but many of them will get tired of seeing a model flying overhead. Above 100' of altitude, who cares whether you turn left or right. It doesn't make much difference as long as you turn now and then to keep the model from flying away. Have you ever imagined in detail what shooting a touch-and-go landing would be like?

"It takes much more skill than you'd think," says Herb. "It's like flying down a funnel. You have to narrow your errors more and more. Maybe you are coming over a fence into the field. You give it a touch of left, and then a touch of right, and then maybe you are sinking a little too soon and you have to give it more power. Too much power and you float, and over the spot you have to give it full power and go round again. Compared to the lazy overhead stuff, it will separate the men from the boys. I get more enthused about the possibility of control tank with Rudevator than I do with elevator and Rudevator."

Of all the yak-yak on the speed question that we've heard over the past two years, one of the most sensible and penetrating suggestions comes from Oklahoma City. The crux of the matter is that speed gradually and inevitably became the sport of the few. Now "the few is getting fewer," if you see what we mean. In Oklahoma City, speed is a dead duck and free flight is coming back strongly. Ray Mathews, no stranger to the contest trails, speaking for the *Sooners*, cites the local contention that if the rules could be changed speed would not die.

"There isn't much skill needed to start up an engine, or to fly before the engine comes in, before starting the time-run. If speed was started from a dead start with the first four (or, however long a race) laps time, it would result in better flying airplanes, improved design in landing gear, fuel system, etc." Matthews has a thought there, men. There is no doubt that such rules would profoundly affect design. Do you think they would bring back speed?

In free flight, the Oklahoma boys favored changing the engine classes. "We believe," said Mathews, "that it doesn't make any difference about the engine size. They all fly the same anyway. The advantage of more than one class is that in the loss of one ship or a crack-up, you aren't out of the running altogether. We would like two classes: A from .00 to .29 and B from .30 to .65; or, if small engines become popular enough, A from .00 to .05, B from .05 to .29, and C from .30 to .65." So far the ½A jobs

(*Turn to page* 8)

EXTRA!! EXTRA!!

Official word has reached us from AMA Headquarters that the 1950 Nationals will be held in July at Dallas, Texas, with Johnny Clemens as Contest Director. Final date had not yet been announced when the notice was mailed, but it will probably be around the last week of July. The Naval Air Base near Dallas is to be the spot, and the local and national Exchange Clubs will begin a sponsorship this year that is expected to continue for at least several more years.

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CONTENTS

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AT LONG LAST some indication of the Air Force plane buying program for its 1950 fiscal year is available. Normally the complete Air Force and Naval Aviation procurement programs for the new fiscal year are revealed shortly after July first of each year, but a series of circumstances have prevented not only the release of this program but its actual final formation. Neither the Air Force nor the Navy know exactly what aircraft they are going to buy during the fiscal year 1950, although this fiscal year is now exactly one-half finished! The long delay by Congress in appropriation of funds for the National Defense establishment, the withholding of a substantial part of these funds by President Truman, the withholding of additional funds by Secretary of Defense Louis Johnson and, most recently, the decision of the Air Force Senior Officer's Board to review the whole Air Force plane buying program have combined to play hob with the procurement program.

BUT AT THIS writing, here is the way the new program shapes up. Yes, there will be more Convair B-36 bombers, 34 of them to be exact. This brings the total ordered to more than 200, the greatest long-range air striking arm in history. This is enough for four heavy bombardment groups, two long-range strategic reconnaissance groups and liberal spare aircraft for replacement and special tests. Even more exciting, however, is the decision to purchase 82 more Boeing B-47 swept-wing six-jet bombers. It has been an open secret that the Air Force had elaborate plans for this airplane from the start since they reopened the standby Boeing-Wichita (Kansas) plant specifically for the purpose. Rumor has it that the new models will be powered by an extremely high-thrust turbo-jet engine which is expected to bring its top speed up close to the present world's speed record of 670 mph. However, the major problem with the B-47 is the devising of means to increase its range—and this can be done by more powerful engines, since at least two and possibly four of the six could be shut down in flight if the remainder were powerful enough to keep the fast plane afloat.

IN THE FIGHTER field, the old standbys predominate, although new models of production types are scheduled. Biggest order is for the new Lockheed F-94 two-man all-weather fighter, which is a development of the T-33A (TF-80C) trainer and a continuation of the highly successful P-80 basic type. Air Force plans to order 188 F-94 fighters during the current year. Joining the F-94 in the all-weather fighter category is an additional order for the Northrop F-89 *Scorpion* two-seat, twin-jet fighter. Air Force will order 27 more F-89's, bringing the total on the books to 75. The standard Allison J-35 turbo-jet engines will continue to be used on the sleek, black *Scorpion*. Still another new all-weather fighter is the North American F-86D of which the Air Force plans to order 122. This is a development of the world record-holding F-86 *Sabre* swept-wing fighter. The prototype YF-86D, which completed its first test flight safely at Edwards Air Force Base (formerly Muroc), Calif., is revealed as a basic F-86 but with a radar unit in the nose and an afterburner in the tail. The nose air intake of the F-86 posed a design problem which was solved by moving the air inlet down below the radar housing and continuing the new lower belly line aft to merge into the afterburner. Air Force is not sure but what it may split this order up or even give it all to the newer North American F-93, which is similar to the F-86D but features flush air inlets alongside the cockpit and preserves a smooth nose for the radar housing. The XF-93 is now at Edwards AFB and may have made its first test flight by the time you read this. Only "standard" fighters left on the list are 111 more North American F-86A *Sabre* fighters and 120 Republic F-84E *Thunderjet* fighters. From a plane that was "down and out" a year ago, the F-84 has made a tremendous comeback as a low-altitude ground cooperation fighter-bomber and the tactical units love it. The F-84E can be loaded up with no less than 32 ("believe it or not") 5-in. HVAR aircraft rockets!

IN THE TRAINER field, the next most numerous, the Air Force is pushing its program to completely revolutionize flight training with new-type aircraft. Splitting the procurement evenly are the Lockheed T-33 and the North American T-28. Air Force will buy 125 of each and, in addition, 10 T-33's for the Navy, which calls them TO-2's. The T-33 is the two-seat trainer version of the jet F-80 fighter, whereas the T-28 is an all-new North American high-performance replacement for the

(*Turn to page 54*)

REPORT FROM THE WEST

by Lew Mahieu

NEWS about West Coast modelers is the high light of our column this month.

We talked to Bill Creany the other day and looked over a couple of his new gas jobs. Bill's home is in Los Angeles but he is staying in Bishop, Calif., where he works for the Department of Water and Power. Bill has an interesting job surveying for a new hydro-electric power project where they are tunneling through the mountains. His latest model is a new ½A free flight gas job powered by a *Cub* and it really does its stuff. He also has a new A job that really looks nice—an "A" plane, of course, as he has been flying the "A" plane design for years. Glad to see him—it was the first time we were able to get together in about six months . . . they work him six and seven days a week. If any of Bill's friends would like to write him, and he sure would like to hear from them, address letters to Bill Creany, General Delivery, Bishop, California.

Don Newberger is still busy with his schooling at Northrop, so he hasn't been doing much flying. As for Don's speed flying, he promised to drag out his "D" job for record trials. Don attended all the Goodyear Races held in California and now has the urge to build his own racer; we are speaking of the full-size jobs! He has already started sketches, and plans to start construction as soon as he can dig up several thousand dollars and a place to build the racer. Don will do his own piloting. He is well fitted for this as he was a flier for Uncle Sam during the war.

S. Estrada took 1st Place in Scale at Las Vegas with this Navion

The nicest New Year's greeting we received was a telephone call from Dallas, Texas. Guess who would phone 1,400 miles rather than write a letter? All kidding aside, we were really glad to hear from Sam Beasley. Sam was so happy that the 1950 Nationals were going to be held in Dallas, that he just had to call and tell us as soon as he found out. He told us about a new set of all-metal speed jobs he was building and that he was really going out to set some records this year. Anyone who has seen Sam's speed jobs will uphold the statement that he builds about the neatest speedsters now flying. Knowing Sam's skill, we just can't wait to see those new ships and we wish him luck at the future contests. We hope to see all the Dallas gang at the NATS this year, and with the wonderful facilities they have there, we know all those attending the 1950 Nationals will be more than satisfied.

A new model club just formed in California is the *Taft Model Airplane Club*. The president is Bob Marlatt, of 318½ Kern Street, Taft. The twenty active members hold a free flight contest the first Sunday of each month—Open class—and everyone is welcome. A trophy is given for high time with ribbons down to fifth place. They fly near the Gardner Field Army Air Base, just east of Taft. They say it is the best flying field in the southern part of the San Joaquin Valley. It is possible to drive twenty miles in any direction, since there are no fences or trees. Russell Hiatt, a member of the *Taft Club* walked off with first in Class B at the last Fresno contest and set a new Class B Open mark of 30:00. Russell only began building free flight gas in 1947.

Frank "Pappy" Greene has moved back to his old stampin' ground in New Mexico.

Saddened Novice contestant views gorgeous trophies he didn't win

He plans to start his own radio and repair shop, and possibly his own radio program. Too bad to lose this steadfast modeler, and we know all the fliers in these parts will miss his dry wit and his presence at most contests and local fields with something unusual to fly. Frank was always willing to serve as a Contest Director, and was treasurer for the *Los Angeles Aero Modelers* for several years. Good luck, Frank.

Speed merchant, Dick Rigney, received a most unusual Christmas present or should we say had it taken from him. Rigney became ill Christmas Eve and was rushed to the hospital, where he had his appendix removed at 9 A.M. Christmas morning. His vacation was all bad luck; a few days earlier he had broken his big toe, and if you know Rigney's size, I mean *big*.

The *Los Angeles Aeromodelers* held their annual Christmas Party, December 28, 1949, at the Parkview Recreation Center. All attending had a fine time. Mr. Holt and other representatives from Northrop Aeronautical Institute were on hand to show a color sound movie on Northrop's eight jet-engined flying wing. Refreshments were served by the concessionaire from the *Aeromodelers* flying field. An indoor meet for tissue-covered models was held, with Robert Issacson winning the Trophy. A drawing was held, and six new engines and two *B & B Micro-Tanks* donated by the K & B Manufacturing Company, Duro-Matic Products Company, and Atwood Manufacturing Company were given to the able winners. The new officers for 1950 were introduced—Andrew Peterson, president; Bob Moncrief, secretary; and Donald Boone, treasurer. A demonstration of *Buster*, a 12" *K & B .035* powered, profile scale model of Wittman's Goodyear Racer, was put on by Dave Baker and Royce Childress. This new model is a G-Line job being manufactured by Premium Manufacturing Company, of Downey, Calif. It is the first completely assembled gas model in the low price range; the engine is installed and requires only the control rod and string to be attached, and the tank to be filled, and then the *Buster* is ready to fly.

The Long Beach boys now have a beautiful place to fly U-control. The Recreation Department has provided space and a property manager at the Long Beach Municipal Airport. There are three stunt circles and one speed circle. The speed circle was repaved and is as smooth as glass. A small contest was held there December 11, for beginners and was handled by Joe Botti and his group from the West side. Joe and his boys should receive full credit for obtaining this fine place to fly.

Herman Shiman and Gene Stiles prepare their line-up of speedsters

Scrap Box

(*Continued from page 1*)

remain more of a novelty around Oklahoma City; the idea seeming to be how big a job can be made to fly on a baby motor. Too big we'd say. Far from being a novelty, some of these little engines are real powerhouses, as witness Owbridge's pint-sized radio model.

Charlie Wood, Seattle, Wash., recounts some interesting experiences with Wakefields; and what we have been wondering about since fiddling with the *Eureka* last year, gives some definite facts on direct comparisons between the NACA 4612 section and the RAF 32. Take the soap box, Charlie.

"I have been building models since 1933," begins Wood, "but just last year became very interested in Wakefields. My first model (pictured in December, 1949, issue) was designed as a test for my force arrangements and no attempt was made to make it a super Wakefield. Built rugged, it weighed over 9 oz. Used a full Clark Y in the stab and an RAF 32 in the wing. My first trouble was a slight roller coaster glide. Thinking the C.G. too far back, I weighted the nose but the trouble persisted. I shortened the nose (after reading Charles H. Grant's book) and this stopped the oscillation.

"Now it dragged its feet in the glide. Glide was as slow as before, but sink was high. Was getting 2½ to three minutes but, as you said, this was just so-so. After reading about the *Eureka*, I felt better in knowing that I wasn't the only one who had troubles. Anyway, I made a second model, keeping the same force arrangements but changing to the NACA 4612. The ship really climbed now. And the glide! The 4612 worked beautifully. I am still amazed by the way the model can hang in the wind and hardly lose a foot of altitude, then turn and continue to glide without a stall or oscillation.

"I have had the ship up for 3:33 on a cold foggy day, mostly glide time, and haven't even used a braided motor as yet. I think the NACA 4612 is the greatest airfoil developed for Wakefields. Model No. 3 was cleaned up and is 30 secs. better." Thanks for the dope Charlie. A four-minute Wakefield is good competition anywhere.

This NACA 4612 airfoil is one of the family of sections developed by the NACA some years ago and will be found, along with familiar foils like the 6409, in NACA Report No. 460, entitled "The Characteristics of 78 Related Airfoil Sections from Tests in the Variable Density Wind Tunnel." When we bought this report in 1935, it was priced at fifteen cents. It still may be available from the Superintendent of Documents, Washington, D.C. The argument in favor of our pet section is that it gives higher lift than the popular 6409 at high angles and, at the same time, drag does not jump in proportion. Since models fly at high angles, the choice of sections based on high L/D's at low angles is not the best method of selection. When, out of curiosity, the 4612 was tried on the *Eureka*, 3:03 was obtained in the rain on 5/8 turns. Glide, as Wood said, was beautiful. The same section got us 4:15 on .049 *Cub* jobs, though it will be found that much incidence will have to be removed after some thinner section has been used. In free flight you'll hear the argument that thin sections mean less drag, hence more altitude. But these thin sections are flown at high angles as a compensation and no one has any idea of how some of these homemade hybrids actually compare with a thicker section like the 4612. Don't know about you guys but we'll never use a 6409 again. Another curious thing: wood knocks the RAF 32. A couple of years back, when learning the Wakefield ropes, we found that the Eiffel 400 then did a better job than the 32. Finally, the 4612 gave top results. All this is mere experimentation, so further experiences should be reported before taking the plunge.

Got your second wind? Light another Jato, Rudolph! From Hal Roth, Los Angeles, comes a blast that makes plenty of sense. Not knowing the outcome of the

rules changes, there's no telling how much of this will happen in 1950. Roth cut loose at AMA and circularized leader members. What did he propose? Eliminating the Senior age division and combining all free flight classes into one grouping. Now, now, take it easy—Roth has some potent arguments!

The Open age classification was established on the theory that the guy over 21 had many advantages—money, experience, wisdom, etc. The way it worked out, the Senior pretty well holds his own. Plenty of Open age entrants thank their stars they don't have to compete against some of those hot Seniors and their ships. Then, if contestants were divided into Juniors (under 18) and Seniors (over 18), one-third of the prizes could be redistributed (maybe the cow shouldn't be milked dry) and administrative work drastically reduced. With the general principle we agree. There are too many events, and the age groups have come in for lots of discussion for several years. But is 18 the right dividing line? How about those little beginners? Maybe the Open and Senior chaps are pitted evenly but can the 13-year-old stand up to the 17-year-old? Should that 18-year limit be reduced? What think you?

When it comes to combining all free flight, Roth fears that baby engine owners, particularly those with *Infants*, will groan about o.o.s's in a wind, relative inefficiency of small ships, and so on. According to the record sheet, Roth argues, an *Infant* job is about as big as a Class C Stick; and if these ships can be timed for ten-minute limits, why can't the shrimp gassies? A *Sailplane* with a 60 is a close match for an *Arden 19 Zeke*. In the last All Western Open, ships of all sizes entered in the one-group event and vari-sized models placed side by side.

Roth, an ex-Clevelander, now is a member of the *Thermal Thumbers*, well known for their most active modeling. With members like Peterson, Cummings, Weathers, Williams, something always is cooking. Recently Roth got out the stop watch and timed motor runs on rubber jobs. It will shock the rest of the country, but these boys are favoring runs of 30 secs., and less, going all out for high climb. (To us, this means pretty flat pitch.) Nor, is that all.

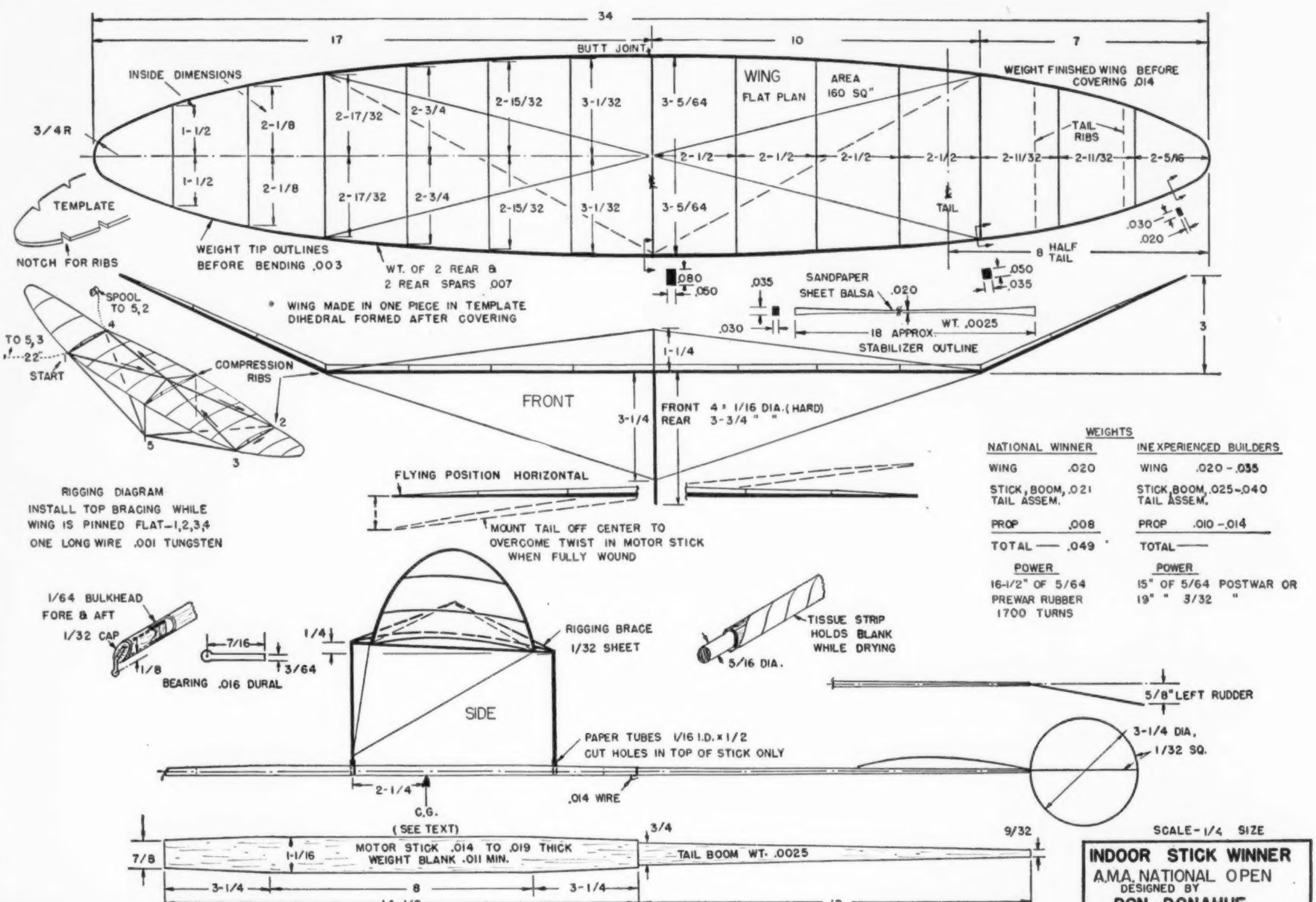
"Andy Peterson," Roth tells us, "has a stick model (wing a la Ritz) with a free-wheeling propeller that simply climbs and climbs. One-bladed free-wheelers are in vogue. With a short non-tensioned motor and a one-bladed free-wheeler, the propeller mechanism is simplified considerably."

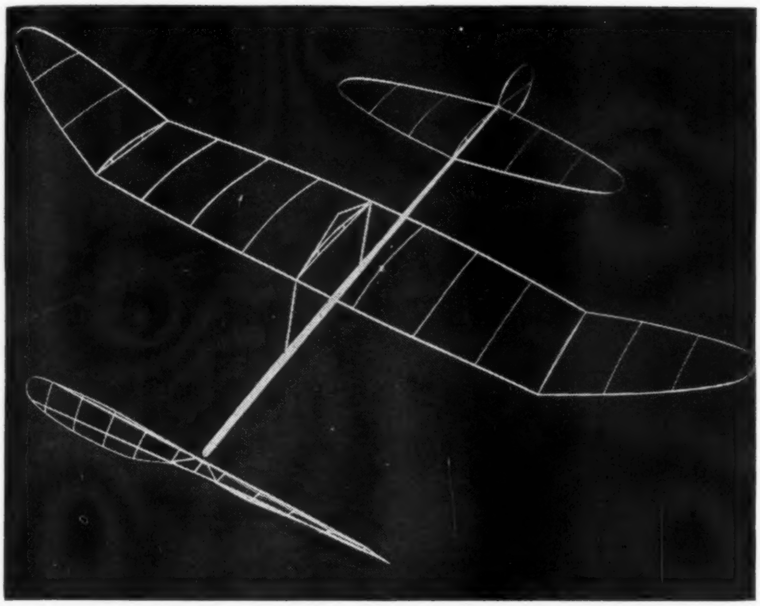
Roth thinks that use of a large area one-blader in free flight might permit stopping the prop is such a position that the proper turn adjustment would result. This is a good thought. For while the prop is spinning, there is no glide turn adjustment to worry about. This leaves a simple power turn adjustment. Thus, you could pick your pylon height to create the same degree of right power turn—if that's what you want—on every flight. How could one spin in then? But it seems to us that that old fox, Frank Ehling, did something like this on his own *Phoenix*. When he won free flight at the Mirror Meet several years ago with that machine, he showed us how the right side blade of the folder remained far enough out in the wind stream to create a turn. Until Roth's remark, this didn't sink in! Of course, you'd have to stop the prop precisely the same way each time.

At a recent R.O.W. contest, Warren Williams' model failed on take-off, digging in the left float, then submerging for an "out-of-sight" in water and seaweed. Someone dived to get the ship from its resting place five feet under the briny. Williams then calmly cranked it up again and took second place. You know, some other chap did that with a speed job; didn't even break the prop but blew the helmet cowl wide open. Figure that out. There are pictures to prove it too. Apparently, model props keep on propping under water.

S. Pedersen, London, tells about a chap named Upson who let go of the handle when flying a 26" *Elfin*-powered model. The ship began to climb free flight in tight circles, dragging wires and handle. After

(*Turn to page* 50)


34
17
10
7
BUTT JOINT
INSIDE DIMENSIONS
WING
FLAT PLAN
AREA
160 SQ"
WEIGHT FINISHED WING BEFORE COVERING .014
3/4R
1-1/2
1-1/2
2-1/8
2-1/8
2-17/32
2-17/32
2-3/4
2-3/4
2-15/32
2-15/32
3-1/32
3-1/32
3-5/64
3-5/64
2-1/2
2-11/32
2-5/16
TAIL RIBS
TAIL
TEMPLATE
NOTCH FOR RIBS
WEIGHT TIP OUTLINES BEFORE BENDING .003
WT. OF 2 REAR & 2 REAR SPARS .007
8 HALF TAIL
.030
.020
.080
.050
.035
.030
SANDPAPER SHEET BALSA
WT. .0025
18 APPROX.
STABILIZER OUTLINE
* WING MADE IN ONE PIECE IN TEMPLATE DIHEDRAL FORMED AFTER COVERING
SPOOL TO 5,2
TO 5,3
22"
START
COMPRESSION RIBS
1-1/4
3
FRONT
3-1/4
FRONT 4 = 1/16 DIA. (HARD)
REAR 3-3/4 " "
RIGGING DIAGRAM
INSTALL TOP BRACING WHILE WING IS PINNED FLAT—1,2,3,4
ONE LONG WIRE .001 TUNGSTEN
FLYING POSITION HORIZONTAL
MOUNT TAIL OFF CENTER TO OVERCOME TWIST IN MOTOR STICK WHEN FULLY WOUND
WEIGHTS
NATIONAL WINNER
WING .020
STICK, BOOM, TAIL ASSEM. .021
PROP .008
TOTAL — .049
POWER
16-1/2" OF 5/64 PREWAR RUBBER 1700 TURNS
INEXPERIENCED BUILDERS
WING .020 - .035
STICK, BOOM, TAIL ASSEM. .025-.040
PROP .010 - .014
TOTAL —
POWER
15" OF 5/64 POSTWAR OR 19" " 3/32 "
1/64 BULKHEAD FORE & AFT
1/32 CAP
1/8
7/16
3/64
BEARING .016 DURAL
1/4
RIGGING BRACE 1/32 SHEET
SIDE
TISSUE STRIP HOLDS BLANK WHILE DRYING
5/16 DIA.
5/8" LEFT RUDDER
3-1/4 DIA.,
1/32 SQ.
PAPER TUBES 1/16 I.D. x 1/2
CUT HOLES IN TOP OF STICK ONLY
2-1/4
C.G.
(SEE TEXT)
.014 WIRE
3/4
9/32
7/8
1-1/16
MOTOR STICK .014 TO .019 THICK
WEIGHT BLANK .011 MIN.
TAIL BOOM WT. .0025
3-1/4
8
3-1/4
14-1/2
12
SCALE-1/4 SIZE
INDOOR STICK WINNER
A.M.A. NATIONAL OPEN
DESIGNED BY
DON DONAHUE



Here is a top indoor prize winner which should put you in the champ class if you follow instructions

by DON DONAHUE

SPRINGFIELD TROPHY WINNER

THIS Class D Indoor Stick model is the largest ever to win the AMA National Championship. Although it is larger than prewar models, the weight has been lowered 20% and the power reduced 28%. This comparison is made with the 1938 winner of Hewitt Phillips, published in April, 1939, issue of MODEL AIRPLANE NEWS.

Our '49 model has already established an envious record by winning the Nationals Open with a flight of 22 min. 27.8 secs., and placing second at the Western States Open with 23 min., 46 secs.

A table of weights have been included on the plan, for both experienced builders and newcomers to follow during construction. Also shown are wing rib templates for either high ceiling (thin airfoil) or low ceiling (thick airfoil) flying. By following the construction as detailed here, you should have no trouble in duplicating the model and turning in flights of duration equal to ours, or even more.

Indoor Propeller Construction. The most important part of an indoor model is design and construction of the propeller. Our winning model used a 16 dia. by 32" pitch propeller of Bob Holland design. The basic idea is to have the propeller built at low pitch so it will use the last 50 to 500 turns in the rubber motor. However, in order to function correctly at full power (1,900-2,000) turns, it must increase pitch (flare) to approximately 50" pitch. With proper design—diameter, pitch, area of blade, strength of spars, etc., it was possible to develop a prop which enabled the model to exhibit a very slow climb under full power, stop climbing about 2-5 feet below the 95' ceiling, cruise for approximately 10 min., then come down very slowly until all winds were used up.

The suggested method of building propeller is outlined herewith:

A—Select a sheet 3/32" x 1" x 12" of "B" cut medium weight wood.

B—Taper by sandpaper (No. 320 through 600) to cross section shown.

C—Cut to length with steel straight edge.

D—Glue (butt joint) the two half spars together in a straight line to make one full length spar.

E—After spars are dry, round corners with No. 400 sandpaper. Note: The front spar should be sanded to approximately 1/64" smaller dia., to allow prop to flare into high pitch at 2/3 to full power.

F—Spars are then placed on jig, as shown in drawing, held in place by 1/16" strips of masking tape. Use spacer "Z" to obtain height of spar.

G—Ribs are cut 1/32" sq. from sheet stock. Make plywood or metal template for guide.

H—Ribs are glued to top of spars and then trimmed to length by measuring up from flat surface (template W) with small triangle.

I—Outline is cut from 1/64" x .020" sheet (16" long). Soak in water and form around template.

J—Glue outline to ribs, starting at trailing edge of last rib with end of rear spar, and glue to end of front spar. Cement remaining ribs of outline.

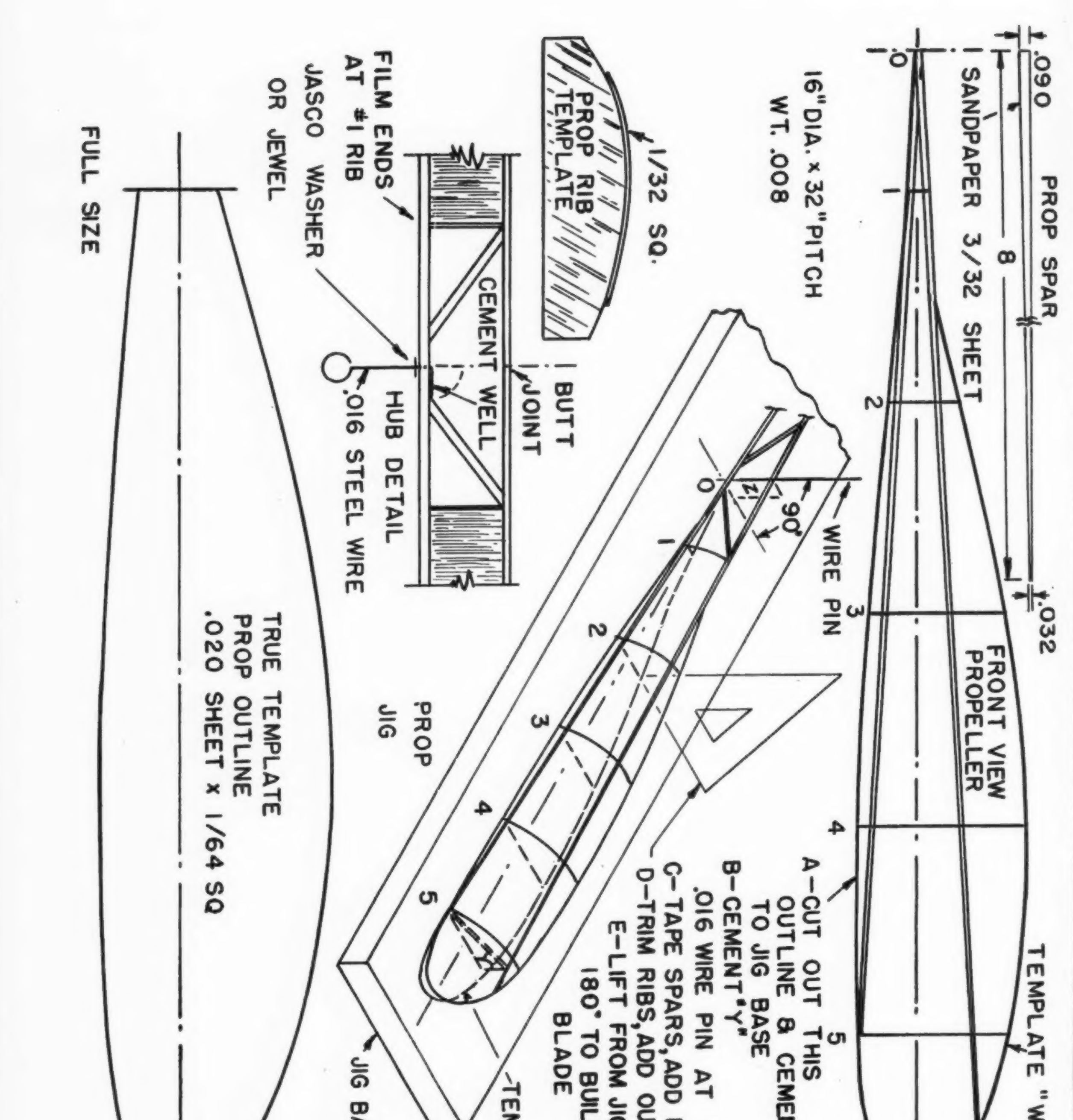
K—Remove 1/16" strips of masking tape and lift the half-finished propeller from jig; rotate 180°, replace tape, and repeat all the operations through (J) to build second blade.

Note: reason for building only a half blade at a time is to secure identical pitch and blade shape on each side.

L—Insert prop shaft through rear prop spar only and bend over 90°. Cement with several coats cement.

M—Cover with microfilm.

Motor Stick. Sand 1/32" sheet (medium soft) to thickness and weight indicated on drawing. Use quarter-grained wood for greater strength. Soak in hot water and wrap around a 5/16" dia. dowel rod. Wrap with strips of tissue and bake in oven, for a few minutes until dry. Remove the dowel form when dry, and cement the seam. Tapered ends can be drawn together and held with masking tape until cement dries. Install longitudinal 1/64" bulkhead (*Turn to page 36*)


PROP SPAR
.090
SANDPAPER 3/32 SHEET
8
.032
FRONT VIEW PROPELLER
0
1
2
3
4
5
TEMPLATE "W"
SPAR SPACERS
1/16 SHEET
Y
Z
16" DIA. x 32" PITCH
WT. .008
1/32 SQ.
PROP RIB TEMPLATE
FILM ENDS AT #1 RIB
JASCO WASHER OR JEWEL
CEMENT WELL
BUTT JOINT
HUB DETAIL
.016 STEEL WIRE
WIRE PIN
90°
PROP JIG
A–CUT OUT THIS OUTLINE & CEMENT TO JIG BASE
B–CEMENT "Y" .016 WIRE PIN AT #0
C–TAPE SPARS, ADD RIBS
D–TRIM RIBS, ADD OUTLINE
E–LIFT FROM JIG & TURN 180° TO BUILD OTHER BLADE
TEMPLATE "W"
JIG BASE
FULL SIZE
TRUE TEMPLATE PROP OUTLINE .020 SHEET x 1/64 SQ
1/32 SQ. OR 1/64 x 1/32
RIBS
1/64 x 1/32 AT CENTER & DIHEDRAL RIBS
.37 MAX. THICKNESS CEILING UNDER 90'
.25 TO .31 FOR CEILING OVER 90'

What About PROFESSIONALISM?

pro-fes'sion-al-ism . . . *Model Flying.* One who competes against amateur model builders while actively engaged in the manufacture or sales of the specific type model or engine in competition.

Conducted by JACK BAYHA

WHAT should be done about the ever-increasing participation of members of the model industry in amateur meets? Two definite camps of opinion have developed. Some maintain it to be a healthy form of fair competition, advantageous to all. Others hold it is slowly wrecking the hobby. In the spirit of free speech, MODEL AIRPLANE NEWS intends to give both sides a chance to put the facts (and fancies perhaps) squarely in front of the American model builder.

We have asked the leaders of the hobby world to express their own, sometimes very candid, opinions. They have, in most cases, come out and taken a definite stand. No matter which side you as a model builder favor, you must take your hat off to these members of the hobby world, who are allowing themselves to be quoted on a very controversial issue.

This forum is in the form of a trilogy—it will consist of three parts.

1. In favor of professionalism.
2. Opposed to professionalism.
3. The individual model builder's consensus of opinion.

We know we are putting a great number of people right on the spot. Whether you agree with them or not, you must admire their frankness of attitude and willingness to take a stand. We want to express the thanks of the publisher and this moderator to the contributors to this forum.

We have had to take each contributor to our forum and place him in a specific camp, for or against professionalism. We have taken the liberty of putting each party where we felt his sympathies best fitted. There has been considerable argument as to the definition of a professional. For this reason we have been forced to set forth one standard definition, which has been discussed with many model builders, and which is felt to be a fair one. Those advocating professionalism have almost without exception objected to our definition. However, when these comments were requested, this definition was set forth, so we'll have to stand on our rights as a moderator, and we have deleted most portions of the comments which are relative to definition.

In favor of Professional Competition we present:

Mr. C. O. Wright—A prominent leader in the field, president of the governing body of model aviation, the AMA.

Mr. Carl Goldberg—A member of the hobby industry, and one of the outstanding model builders of all time.

Mr. Art Hasselbach—Another hobby industry member and a very active competitor.

Mr. Harold De Bolt—Member of the industry and prominent National record holder.

Mr. Ray Acord—A member of the hobby industry and one of the top fliers of the nation. (1949 National Champ.)

Anonymous—A former engine manufacturer, now in the distributing end of the model business.

First, by right of position, comes C. O. Wright. His comments need no embellishment, and are given completely:

"I am in favor of an unrestricted Nationals—one open to all modelers. Consistent with this principle, the vocation of the contestant should not be a consideration. The one qualification for participation in a regular AMA sanctioned meet, including the Nationals, should be Academy membership. I, therefore, say let all who come, manufacturer, expert, novice, join in the fun. Who is afraid of whom anyway?

"This question came up doubtless because of control speed. In that category it probably would be difficult to distinguish between a manufacturer and the hot shot who soups up motors at his, or the village machine shop. Speed is only a small part of the game, so why throw the manufacturers out in all events because of the speed craze?

"As a matter of fact, the Juniors and Seniors are protected now. (Pardon me, Classes III and II.) The manufacturers are over twenty-one years of age and are in Class I (open to the old-timers). This, in my judgement, takes care of the situation admirably. I still insist that in most categories the expert is not too much better than the Novice, and the manufacturers spin-in as often as any of us. I like to see members of the industry on the field competing. We learn a lot from them. And who knows, they may learn something from rubbing elbows with us and pass it on through commercial channels for the *benefit of all modelers*. The manufacturers do much for modeling. So far as I can see, I want them to be one of us. They are good Joes. Let them stay in. They are good businessmen, but I don't think they are any hotter than the other balsa-butchers on the contest field."

From Carl Goldberg comes another short, to-the-point comment, which we put forth in its entirety:

"Having in the past been a competitive flier in the free flight field, I found no apparent resentment on the part of my fellow contestants. In fact, they seemed to enjoy the opportunity to compete against me, especially those who beat me.

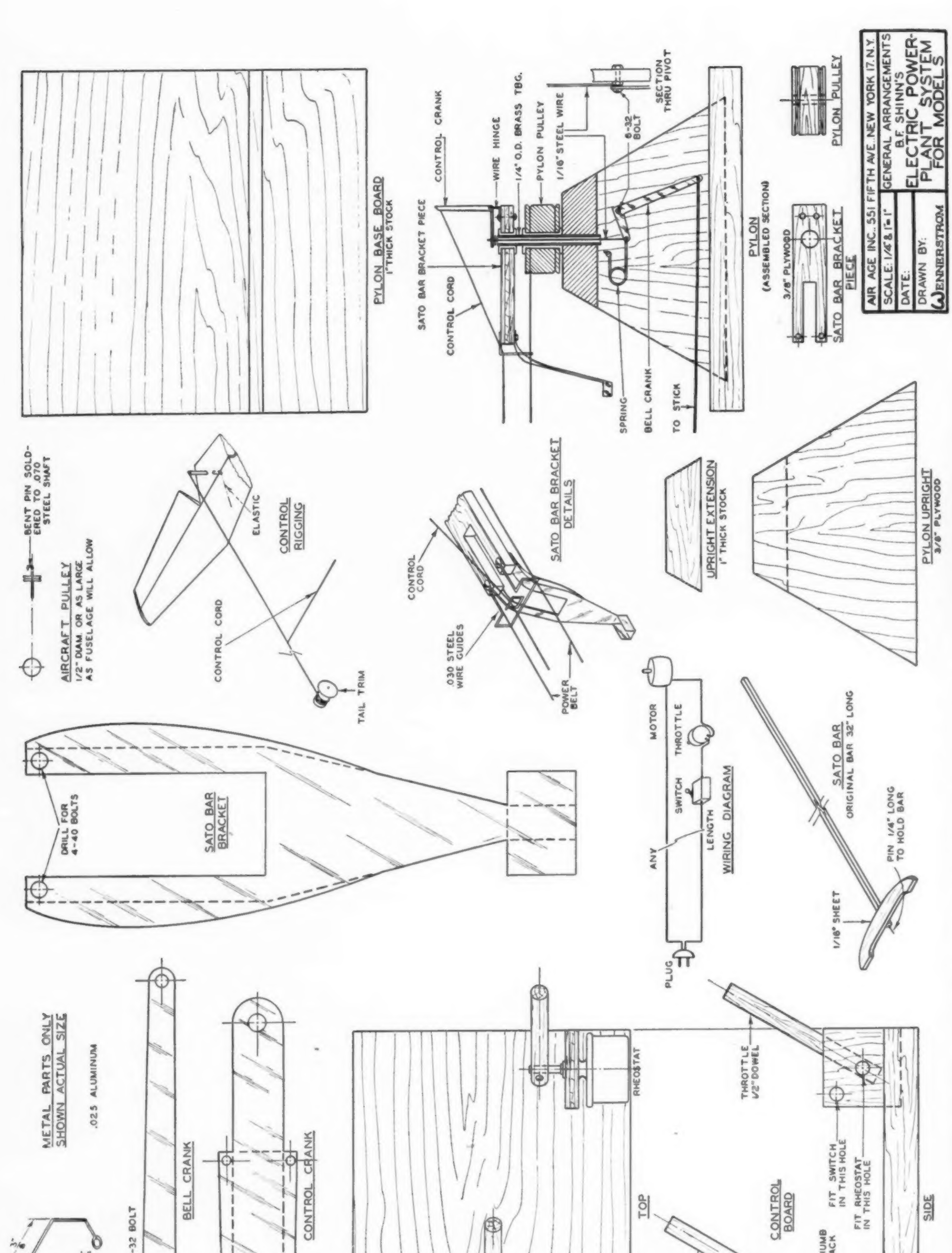
"It does seem that there is a slightly different situation in speed, where the winning margin is usually small, and can be supplied by equipment specially prepared by a manufacturer. There, however, experience shows that few manufacturers have gone to the trouble to try to win with special stuff, because it couldn't do them much good unless they could put it on the market. In that case, it would no longer be special.

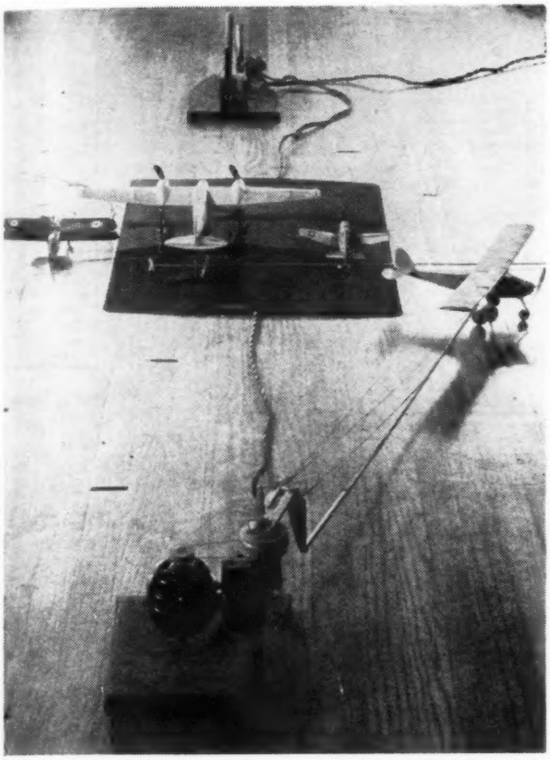
"Experience has shown, also, that there are many clever hobbyists who re-work their factory-made items to produce exceptional results, too.

"Professionalism, it seems to me, is a subject which produces a lot of smoke for a little fire. Possibly more harm comes from the professional amateur, who goes to many meets and may be said to hog the prizes, but in either case, I have always felt that the good done counterbalances any slight evil."

Harold De Bolt sent us an excellent defense of the profes-

(*Turn to page 45*)


AIR AGE INC. 551 FIFTH AVE. NEW YORK 17, N.Y.
GENERAL ARRANGEMENTS
B.F. SHINN'S
ELECTRIC POWER-PLANT SYSTEM FOR MODELS
SCALE: 1/4" & 1=1"
DATE:
DRAWN BY: WENNERSTROM
PYLON BASE BOARD
1" THICK STOCK
SATO BAR BRACKET PIECE
CONTROL CRANK
CONTROL CORD
WIRE HINGE
1/4" O.D. BRASS TBG.
PYLON PULLEY
1/16" STEEL WIRE
6-32 BOLT
SECTION THRU PIVOT
SPRING
BELL CRANK
TO STICK
PYLON
(ASSEMBLED SECTION)
3/8" PLYWOOD
SATO BAR BRACKET PIECE
PYLON PULLEY
BENT PIN SOLDERED TO .070 STEEL SHAFT
AIRCRAFT PULLEY
1/2" DIAM. OR AS LARGE AS FUSELAGE WILL ALLOW
ELASTIC
CONTROL RIGGING
CONTROL CORD
TAIL TRIM
SATO BAR BRACKET DETAILS
CONTROL CORD
.030 STEEL WIRE GUIDES
POWER BELT
UPRIGHT EXTENSION
1" THICK STOCK
PYLON UPRIGHT
3/8" PLYWOOD
DRILL FOR 4-40 BOLTS
SATO BAR BRACKET
MOTOR
THROTTLE
SWITCH
ANY LENGTH
PLUG
WIRING DIAGRAM
SATO BAR
ORIGINAL BAR 32" LONG
PIN 1/4" LONG TO HOLD BAR
1/16" SHEET
METAL PARTS ONLY SHOWN ACTUAL SIZE
.025 ALUMINUM
WIRE HINGE
3/8"
1/4"
DRILL TO CLEAR 6-32 BOLT
BELL CRANK
CONTROL CRANK
RHEOSTAT
THROTTLE 1/2" DOWEL
TOP
CONTROL BOARD
FIT SWITCH IN THIS HOLE
FIT RHEOSTAT IN THIS HOLE
THUMB TACK
CONTROL STICK 1/2" DOWEL
SIDE



One ship ready to go, 3 others "on the line." Note "cockpit" in background

PARLOR PURSUIT

by B. F. SHINN

Here's a way to practice your controline routine in the comfort of your own parlor

AS WE lay on our sofa, we dreamed of a model with small enough wingspan to fly in the house, and powered by an electric motor so we could fly it without having to get up now and then to wind it up, or fill the tank. We also wished it to be under full control, then we could do a bit more than lie there getting dizzy watching it make lazy circles around the lampshade. Such a project seemed to require a tiny electric motor, and trying to design one that was light enough kept disturbing our rest. Passing over the various wild schemes evolved in our semi-conscious state, we eventually realized that the solution was the same as in U-control, the pilot is too heavy, so you leave him on the ground, holding a string! In our case, the motor is too heavy so we'll leave it on the ground, holding the belt!

A few experiments showed us that a belt of No. 25 linen thread, running in wooden pulleys whose grooves were turned so that the belt wedges between the sidewalls, rather than lies on the bottom of the groove, would transmit all the power we needed. Very little tension was required to maintain the drive.

It was felt that centrifugal force would maintain the tension once the model was airborn; the problem was to hold the belt tight until that time. If a full-size airplane may be permitted take-off assistance, such as the Jato-bottle, we saw no reason why we couldn't have a take-off assist of some form, too. We soon rejected the Jato-bottle idea (the trip to the next county to recover the bottle after each take-off would break into our rest too much). The final solution took the form of a stick. Our "Sato-bar" (Stick-Assisted-Take-Off) has functioned throughout numerous flights without once fouling the job, even when we let such ham-handed pilots as air line Captains try out our captive airplanes, and we are quite satisfied with the results.

Any airworthy rubber model of about 10 to 20" span can be adapted to the system, so we shall spend no time describing the models. Merely replace the rubber motor with a back-bearing for the prop-shaft, located about 1/4" forward of the C.G. Then extend the prop shaft through this new bearing, and the original front bearing. Replace the prop with one of about 1-1/2 to 3" diameter and 1-1/2" pitch and equip the other end of the shaft with a balsa pulley as large as you can fit in the fuselage, and the power plant alterations are all made. A wire guide for the lines will have to be fitted at the wingtip and the elevators equipped with control horn and bridle line to provide control.

Control is conveyed to the model through a separate linen thread attached to a bridle cord on the side of the fuselage. This is shown on the drawings. The forward end of the bridle cord is taken a couple of times around a length of 1/16" round balsa, which has been pushed tight into a hole drilled in the balsa nose block. Dope the bridle cord to this balsa dowel, and glue a small nose-plug or other round button on the end of the dowel to turn it by; now you have an easy way of adjusting the bridle tension—sort of a tail-trim!

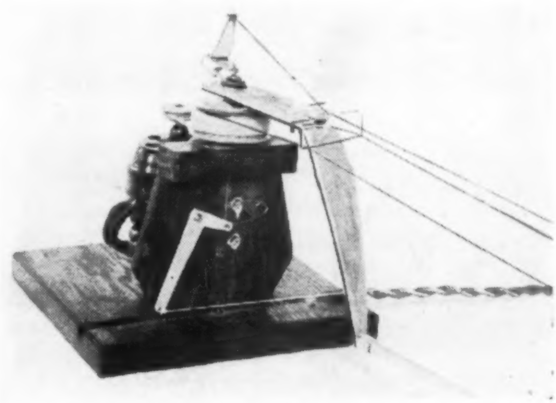
The other end of the bridle cord attaches to the upper end of the control horn. This consists of a 1/2" length of 1/32" square or streamline balsa cemented to the elevators with 1/8" projecting below. To the lower end of the horn, attach a length of very fine elastic, and anchor the other end of the elastic to a strategic point on the stabilizer so that the rubber pulls the elevators down lightly.

Attach the control cord to the bridle an inch or so aft of the C.G. so that tightening th econtrol cord tends to turn the nose out slightly to maintain belt tension when part of the centrifugal force is sustained by the control cord instead of the belt.

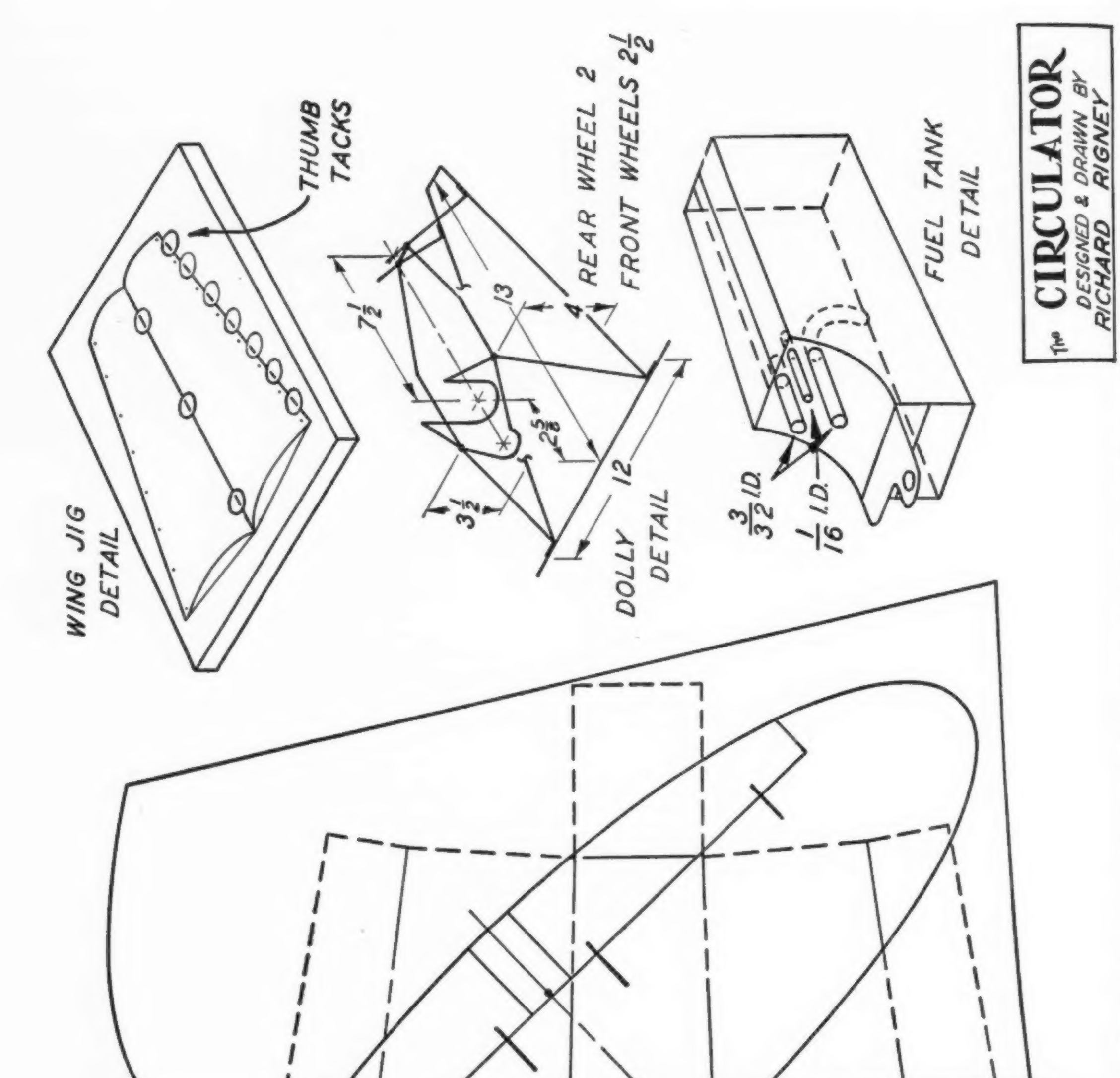
The heart of the system is the pylon. Ours consists of a baseboard 10" x 10" x 1" with a plywood upright set in a groove 2" off center. This arrangement, shown in the photographs and the diagrams, allows the motor to be mounted with its weight approximately central on the baseboard. The shaft of the motor is mounted vertically and carries a pulley turned of soft white pine 1" in outside diameter. (No lathe is available here, so we cut out circles of soft pine slightly larger than the required pulley with a coping saw, drilled close-fitting holes for the motor shaft in their centers, pushed them on the shaft, clamped the whole thing—motor and all—in the vise with the shaft about level with the jaws and turned the pulleys with a pocket-knife.)

A cord belt from the motor pulley runs in the lower groove of another wooden pulley 2" in diameter, and turned out of 1" stock. This large pulley has a second groove near its top which drives the belt from the model. Turn this upper groove carefully and quite narrow at the bottom so that it will grip the thread well. Obtain the center bushings from two old radio volume controls. The local radio service man will no doubt contribute several to the cause of science if you outline your needs. Most of these controls are drilled for 1/4" shafts. Drill the center of your 2" pulley to fit one of these bushings and insert and tighten in place.

To allow control, the large pulley turns (*Turn to page* 42)



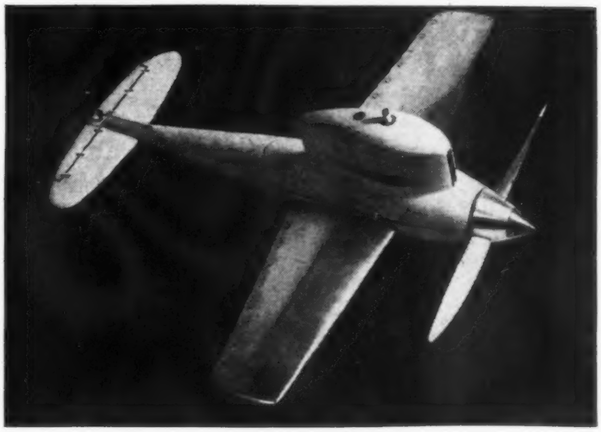
Close-up of pylon shows sato-bar holder and wire guides for 3 lines to plane


The CIRCULATOR
DESIGNED & DRAWN BY
RICHARD RIGNEY
WING JIG DETAIL
THUMB TACKS
DOLLY DETAIL
REAR WHEEL 2
FRONT WHEELS 2 1/2
FUEL TANK DETAIL
3/32 I.D.
1/16 I.D.
STABILIZER
1/16 BIRCH PLYWOOD
FUEL TANK .005 TIN
WING 24ST .012
BICYCLE SPOKE
.010 TIN
COWL BRACKET

The Circulator

by LEW MAHIEU

This design can boost you into the winning class

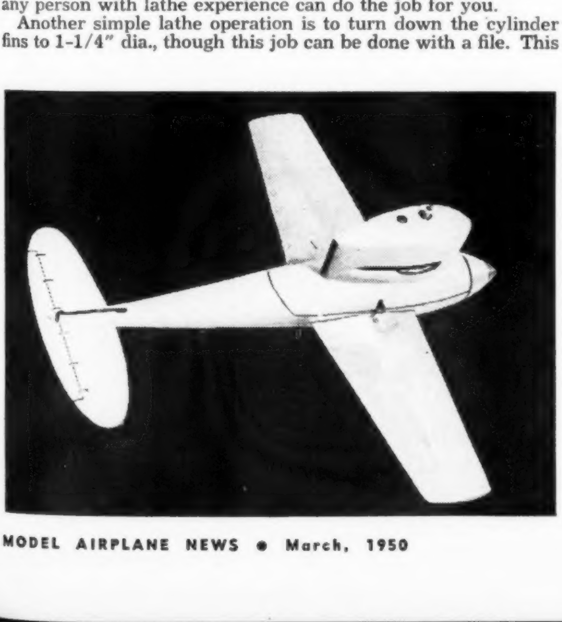


THE outstanding features of the *Circulator* are its rugged construction, its lightness and past contest record. By rugged, I mean a mahogany and spruce fuselage, metal wings with a hardwood spar, and a plywood stabilizer. Despite all this beef, it only weighs 14 oz. Its contest record speaks for itself; the Nationals B event was won with a speed of 132.84 mph. This was the first contest for my *Circulator* and my first speed contest in 1949. The next meet in which I flew the ship was at the Sky Kings Contest in Santa Monica, Calif., on September 11, 1949. Class B speed was won with a flight of 134.23 mph. In addition, I was very happy once again to set a speed record, for this flight raised the record held by those two swell fellows, Frank Manley and Vern Hudson of Wichita, Kansas. Three weeks later on October 1, 1949, at the Los Angeles Western Open, my *Circulator* upped the national record again to 138.41 mph, which is the AMA Class B Open Speed record as this issue goes to press.

Although I don't claim to be an authority, in view of the success I have had with speed, I would like to say that the *Circulator* is about the ultimate in contest design. This ship is the third in a series of speed designs by Dick Rigney. Rigney was the first to use the metal wing-wooden fuselage idea. In the past year the idea has been picked up by other speed fliers who like the ruggedness of a metal wing. This is now about the most popular type of speed ship construction in the West.

The equipment I have used on all of my flights was: *McCoy .29 Sportsman* with a *McCoy .36* back plate and a double ball-bearing front plate, a *Champion VG-2* glow plug, an 8—9 *Tornado* propeller cut to a 7-1/2" dia., and *Supersonic 1000* speed fuel. A *Sportsman* was chosen for power because of the greater by-pass area and the additional porting on the by-pass side of the cylinder. The *McCoy .36* back plate was installed as recommended by the engine makers, and really increased the power. If you choose to power your *Circulator* with a *Sportsman*, and want to install a .36 back plate, but haven't the facilities to turn down the back of the crankcase to take this back plate, almost any person with lathe experience can do the job for you.

Another simple lathe operation is to turn down the cylinder fins to 1-1/4" dia., though this job can be done with a file. This will let you build a smaller cowling around the engine, thus reducing drag. An idea picked up from Tony Grish is that of cutting the back of the exhaust stack away and carving a groove in the cowl to permit greater exhaust scavenging. I highly recommend *Tornado* propellers. The *Circulator* and *Sportsman* combination operates best with an 8—9 *Tornado* prop, cut to 7-1/2" dia. For fuel, I use only *Supersonic 1000* and sometimes change the formula on the flying field by adding a little castor oil or nitromethane, depending on climatic conditions.



CONSTRUCTION: the construction of the *Circulator* is quite simple. The fuselage is usually started first. If Philippine mahogany is not available, other common woods such as pine can be used, but for a rugged long lasting ship, choose a block of mahogany 1-1/2" x 2-1/2" x 16" and a block of spruce 1" x 2-1/2" x 16". These blocks are planed on the 2-1/2" x 16" surface then placed together and held by long woodscrews at each end. When placed in the wood lathe for turning, make sure that the parting line is 5/32" away from the spruce block and into the mahogany block—refer to the plans. Use the full size plans for the proper diameters when turning the fuselage. Do not turn to actual finished size; it is best to leave the entire fuselage 1/16" large, then sand to the proper diameter on the lathe. Now the two halves can be separated and the chisel work begun. Do not attempt to make the fuselage too thin—again refer to the plans.

Depending upon the wood used and the thickness of the fuselage walls, the finished weight of the model will vary from 13 to 14 oz.—mine weighs 14 oz. When the notches have been cut in the bottom half for the engine location, mark and drill holes for engine mounting bolts. Drill holes straight through and groove bottom of fuselage for installation of bicycle spokes. This U-bolt type of mounting is really good and is easily made. Cut four bicycle spokes and bend to fit the groove with an overlap of 3/4". Solder the overlaps with a very hot iron using acid flux. This will do the job fast and surely, and will not burn the wood. Ream out the engine mount holes to take the bicycle nipples, then cut the nipples off flush with the bottom of the engine lugs. Now mount the engine and apply cement around the bottom of the fuselage over the U-bolts.

Cut a hole in the fuselage top half to let the engine cylinder through. Refer to the plans for location of the line along which to cut the top half. Now cement the rear top piece in place and push forward slightly to take up the space made by the saw cut.

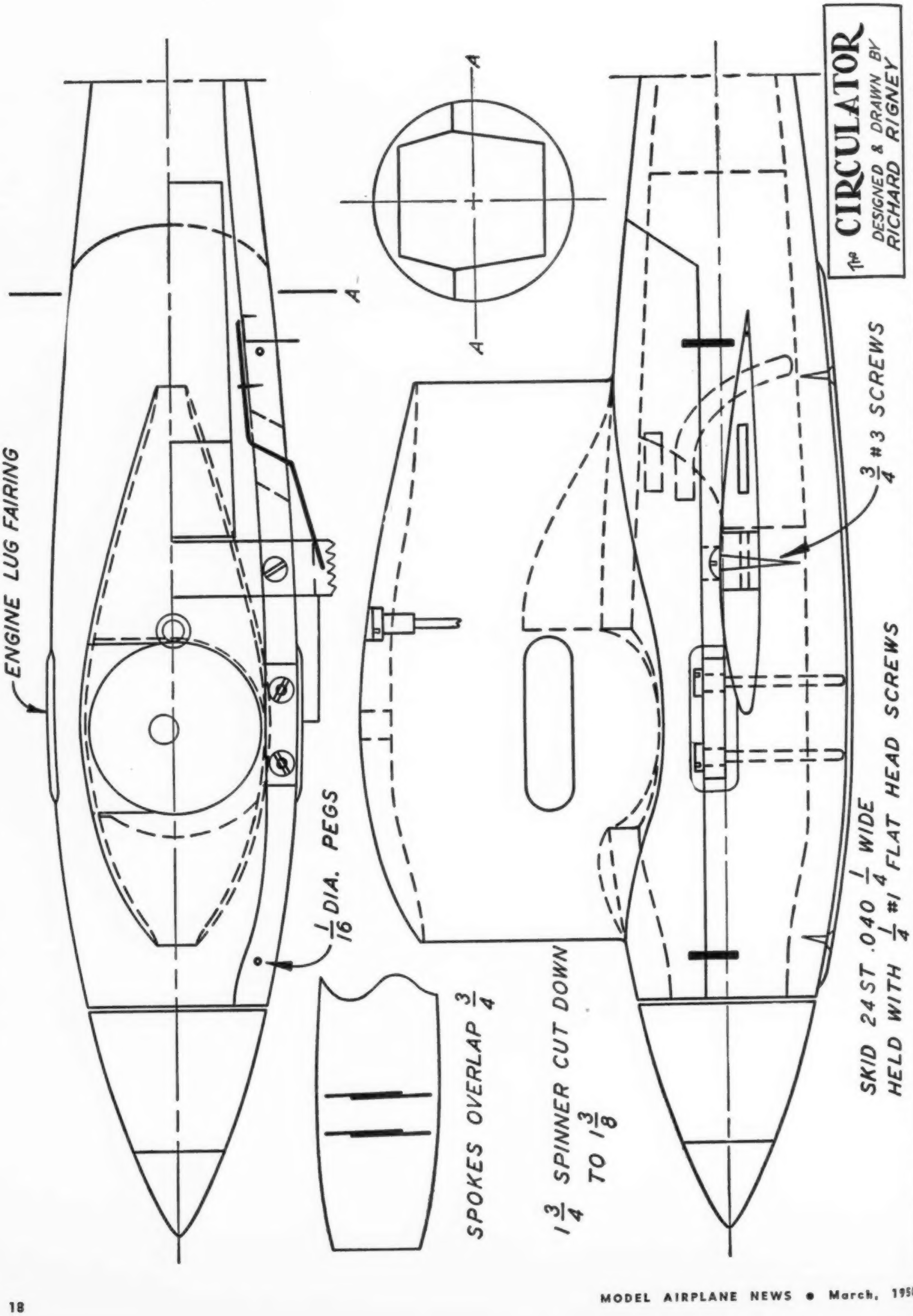
Wrap a few layers of masking tape around the cylinder and proceed to build the cowl by cutting balsa blocks, shaping and cementing to fuselage in front and in back of the engine. If speed-skin, or 1/20" plywood, is not available for cowling sides, balsa may be substituted. Cowling top is made of hard balsa.

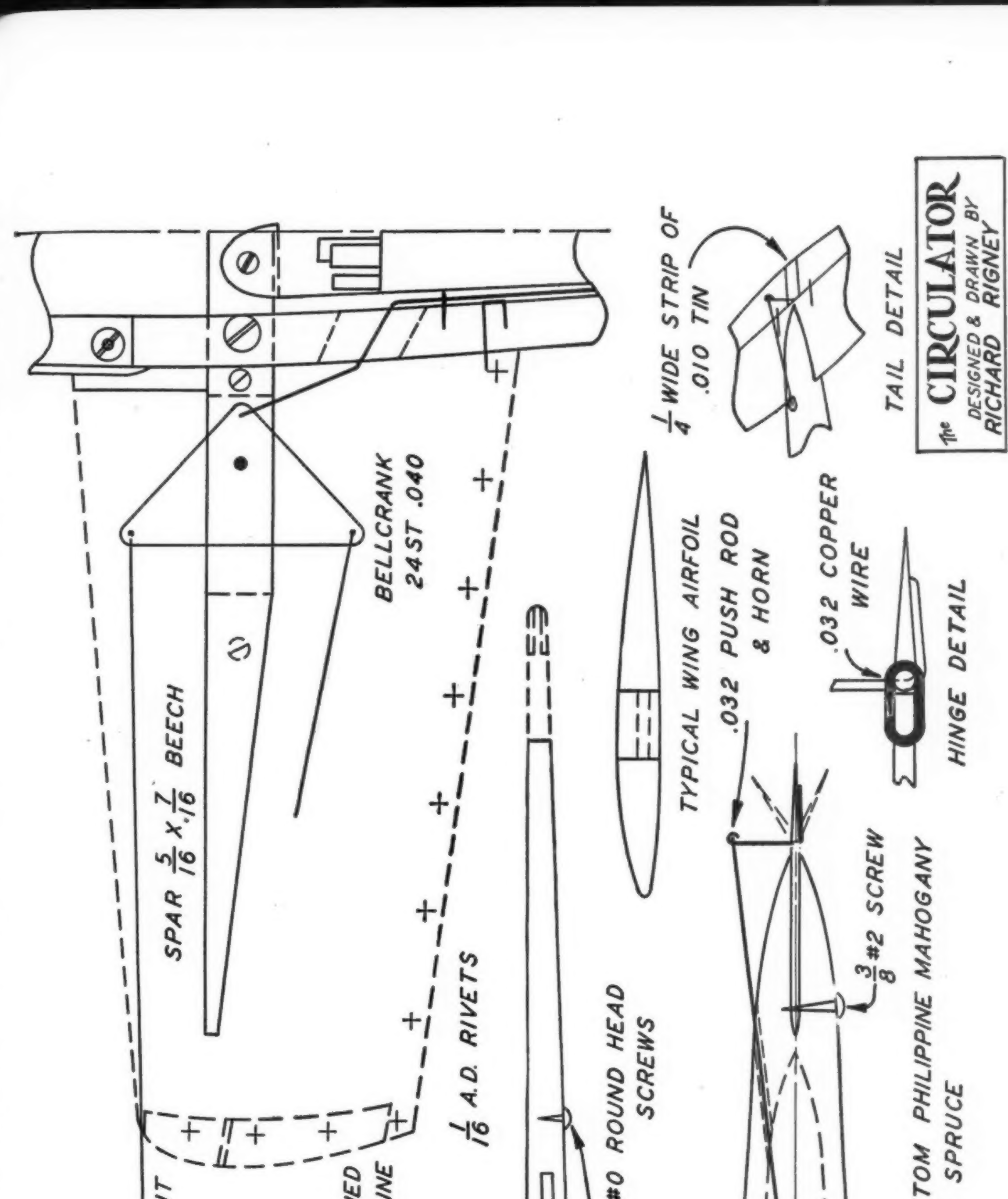
The next step is to carefully and accurately cut a notch in rear of the fuselage bottom half for stabilizer. The stabilizer is made of 1/16" plywood, use full size pattern from the drawings. The elevator hinges are of .032 copper wire and soldered. The control horn is made of .032 piano wire soldered to a strip of tin 1/4" wide, then this is cemented to the elevator. After the stabilizer is finished, it is glued in its slot in the fuselage.

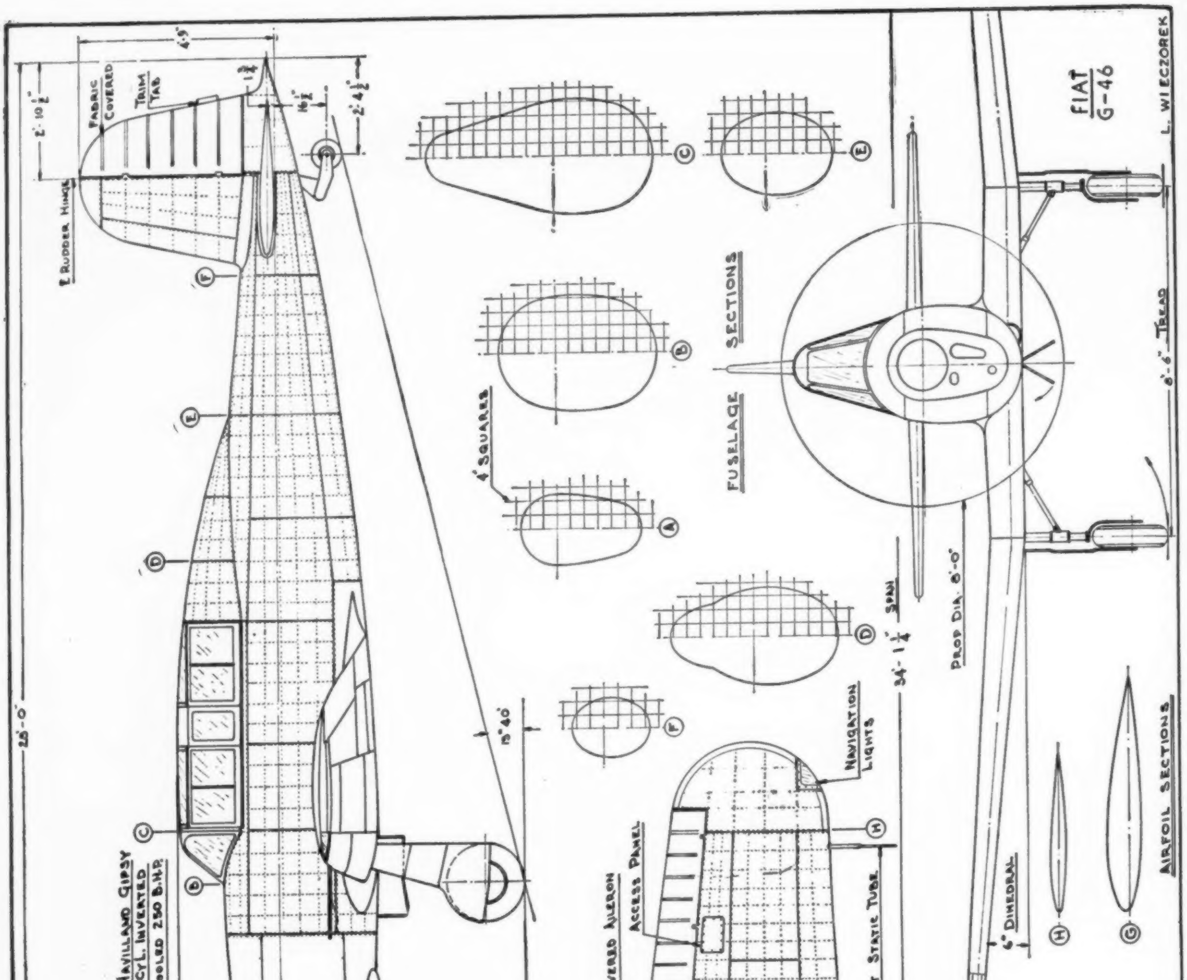
The wing spar is made of beech, or any wood of like strength, and should be 11" long—check the plans for dimensions and shaping. After the holes are cut in the fuselage for the push rod and wing spar, the spar is slid into place and held with two 3/4" No. 3 woodscrews.

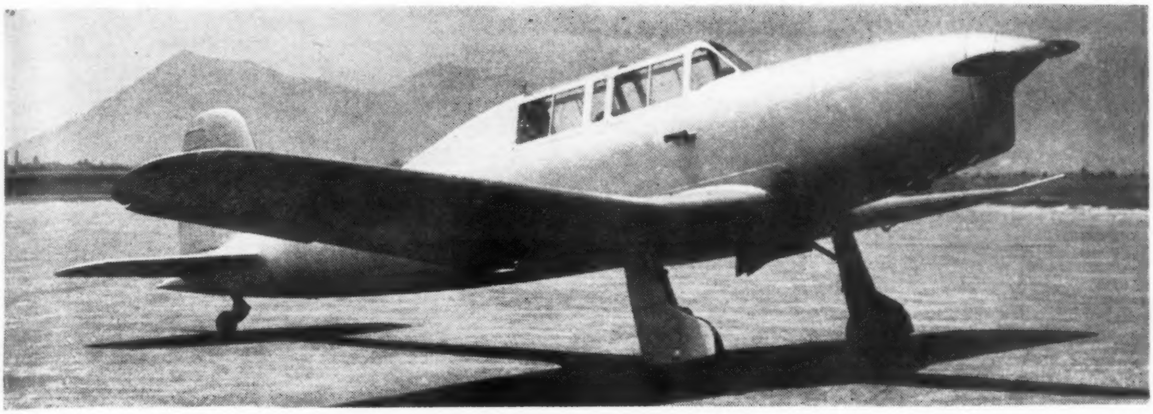
The wings are made of .012" 24ST aluminum, which can be purchased at aircraft supply and surplus stores. Use full-size

(*Turn to page 44*)


The CIRCULATOR
DESIGNED & DRAWN BY
RICHARD RIGNEY
ENGINE LUG FAIRING
A
A
A
1/16 DIA. PEGS
3/4 #3 SCREWS
SPOKES OVERLAP 3/4
1 3/4 SPINNER CUT DOWN
TO 1 3/8
SKID 24 ST .040 1/4 WIDE
HELD WITH 1/4 #1 FLAT HEAD SCREWS


SPAR 5/16 X 7/16 BEECH
BELLCRANK 24ST .040
.032 LEAD-OUT WIRES
1/16 A.D. RIVETS
1/4 #0 ROUND HEAD SCREWS
FUSELAGE TURNED WITH PARTING LINE 5/32 OFF CENTER
TYPICAL WING AIRFOIL
.032 PUSH ROD & HORN
3/8 #2 SCREW
FUSELAGE BOTTOM PHILIPPINE MAHOGANY
FUSELAGE TOP SPRUCE
1/4 WIDE STRIP OF .010 TIN
TAIL DETAIL
.032 COPPER WIRE
HINGE DETAIL
The CIRCULATOR
DESIGNED & DRAWN BY RICHARD RIGNEY


FIAT G-46
L. WIECZOREK
SCALE - 1/2"=1'-0"
FUSELAGE SECTIONS
1/4" SQUARES
AIRFOIL SECTIONS
ENGINE: DE HAVILLAND GIPSY QUEEN 30 6 CYL. INVERTED IN-LINE, AIRCOOLED 250 B.H.P.
CARBURATOR AIR INTAKE
FLAP PANEL
FABRIC COVERED AILERON
ACCESS PANEL
NAVIGATION LIGHTS
PITOT STATIC TUBE
6° DIHEDRAL
PROP DIA. 8'-0"
34'-1 1/4" SPAN
8'-6" TREAD
EXHAUST STACK DETAIL RIGHT SIDE ONLY
WING WALK
RUDDER HINGE
FABRIC COVERED
TRIM TAB
THRUST
28'-0"
13°40'



Fiat G.46

by ROBERT McLARREN

OUR *"Plane of the Month,"* the Fiat G.46, represents a type of aircraft of which there is no counterpart in this country. It is a "sporting" type, a familiar phrase used rather loosely to describe a plane that is not employed for business but, upon closer examination, a phrase uniquely describing several European types, though not appropos to any type in the United States.

We have become accustomed to European "wealthy sportsmen" who drive "sporting cars," race "sporting boats," and even use "sporting cycles" in their week-end games. These automotive gadgets are normally fast and exciting but unbelievably expensive. They serve no useful purpose other than the amusement of the owners and their friends. Assuredly the European sporting airplane, with its high power, high performance, and high cost cannot be compared in any manner with the conventional U.S. personal aircraft. The latter is designed and produced for low purchase price, low operating cost and maximum utility.

This comparison is not intended in any way to belittle the European sporting airplane, most of which are truly high-performance types and many of which eventually serve as prototypes for future combat aircraft. (The widely-known Nazi Messerschmitt Me-109, which fought throughout World War II as the standard German fighter, actually began life as the Bayerische Fleugzeug Bf-109 sporting plane!) They are simply indicative of a different way of life of the continental and domestic brand of youth. The only real counterpart of the European sporting car is our own Indianapolis racer, which is hardly a "family car" for the average pocketbook. The only real counterpart of the European sporting plane is a number of surplus World War II *Mustang* and *Corsair* fighters flown at the National Air Races.

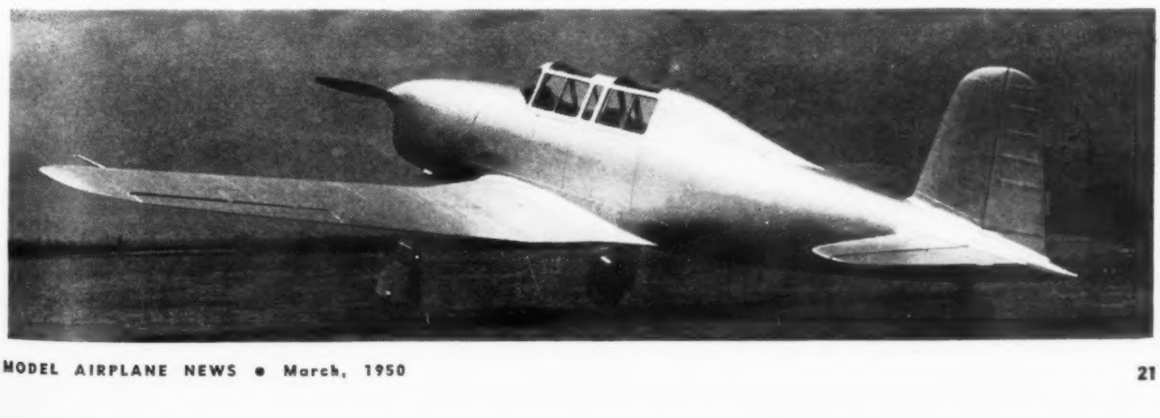
And so it is difficult, if not impossible, to compare the Fiat G.46 with anything that is available here in the United States. Dimensionally, and in general the arrangement is most closely approached by the Fairchild PT-19; but in power and performance the difference is substantial. In these latter categories it might be compared to the Ryan *Navion* and Beach *Bonanza* but, obviously, these four-place family and business machines are designed for a widely different purpose than our *"Plane of the Month."* The Fiat G.46, therefore, is a wholly European type adapted principally to sport touring, acrobatics and advanced training.

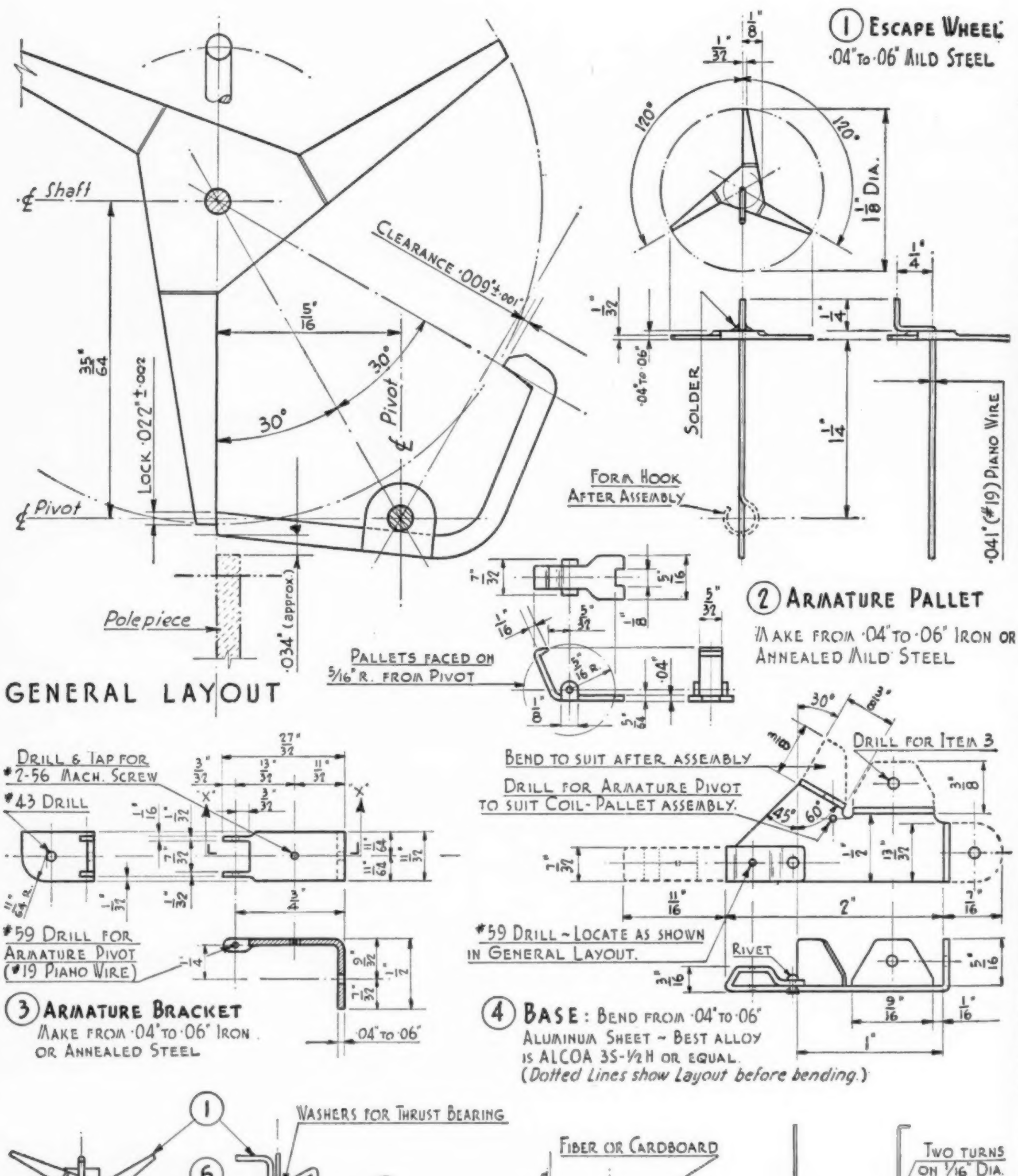
Fiat is an old and honorable name in Italy, but one only casually associated with aviation. It is an huge industrial combine of many factories in many and diverse lines of production. To the men of the 15th Air Force it was a giant ball-bearing works at Turin, Italy. To many American millionaires of the 'twenties it was a racey sporting car. To countless Italian and German industrialists, it was a steel plant, a casting foundry, a rolling mill, etc.

It was March 30, 1926, that Fiat entered the booming aircraft industry by buying an already prosperous plant. The aircraft activity actually dates back to January, 1916, when it was founded by Ing. O. Pomilio, designer of the famed World War I *Pomilio Scout.* On April 24, 1920, Societa Anonima per Construzione Ing. O. Pomilio and Company was merged with Gio. Ansaldo and Company, who had produced the well-known Ansaldo *S.V.A. Scout,* most renowned of all World War I Italian combat planes. It was in an Ansaldo *S.V.A.* that Major Francesco Baracca, top Italian ace of World War I, scored most of his 36 victories.

The new combination of Pomilio and Ansaldo was called Aeronautics Ansaldo S.A.; and in the summer of 1925 the company began the production of aircraft designed by engineers of the Fiat Company. On March 30, 1926, it was absorbed by the Fiat Company under the name Aeronautica d'Italia but its products have been known by the name "Fiat" ever since. One of the best known products of the Fiat Company was in C.R.32 biplane fighter, which was standardized by Mussolini in his rebuilding of the Italian Air Force. This trim craft will be recalled by its "W" interplane struts and its panted landing gear. It is interesting to note that this "spider" arrangement of

(*Turn to page* 34)





GENERAL LAYOUT
℄ Shaft
℄ Pivot
CLEARANCE ·009"±·001"
LOCK ·022"±·002
30°
30°
℄ Pivot
35/64"
15/16"
Polepiece
·034" (approx.)
(1) ESCAPE WHEEL
·04" TO ·06" MILD STEEL
120°
120°
1 1/8" DIA.
SOLDER
FORM HOOK AFTER ASSEMBLY
·041" (#19) PIANO WIRE
(2) ARMATURE PALLET
MAKE FROM ·04" TO ·06" IRON OR ANNEALED MILD STEEL
PALLETS FACED ON 5/16" R. FROM PIVOT
DRILL & TAP FOR #2-56 MACH. SCREW
#43 DRILL
#59 DRILL FOR ARMATURE PIVOT (#19 PIANO WIRE)
(3) ARMATURE BRACKET
MAKE FROM ·04" TO ·06" IRON OR ANNEALED STEEL
BEND TO SUIT AFTER ASSEMBLY
DRILL FOR ARMATURE PIVOT TO SUIT COIL-PALLET ASSEMBLY.
DRILL FOR ITEM 3
#59 DRILL ~ LOCATE AS SHOWN IN GENERAL LAYOUT.
RIVET
(4) BASE: BEND FROM ·04" TO ·06" ALUMINUM SHEET ~ BEST ALLOY IS ALCOA 3S-½H OR EQUAL.
(Dotted Lines show Layout before bending.)
WASHERS FOR THRUST BEARING
PALLET STOP NOT SHOWN
ARMATURE PIVOT ·041" PIANO WIRE
#2-56 MACH. SCREWS
STEEL SHIMS FOR ARMATURE GAP ADJUSTMENT
FIBER OR CARDBOARD
ABOUT 150 TURNS #26 MAGNET WIRE
(5) COIL ASSEMBLY
CORE IS MADE FROM 3/16" DIA. SOFT IRON
TWO TURNS ON 1/16" DIA. MANDREL.
(6) SPRING
FORM TO SUIT FROM ·01" PIANO WIRE
AIR AGE INC., 551 FIFTH AVE., NEW YORK, N.Y.
DETAILS & ASSEMBLY
ESCAPE MECHANISM
FOR RADIO CONTROL
Scale: 12"=1'-0"
Drawn: J.S.L.
Date:
Checked:

The finished escapement shown with a pen cell for size comparison

PART TWO

Reliable Escapements

by J. S. LUCK

OVER a period of years, a friend and I have tested, and finally satisfied ourselves, that the 3-toothed escape wheel is best. We admit that it may be just two voices in, possibly, thousands. Even so, those who intend to stick by the conventional 22½° or 45° escape action will not find these notes entirely without value. The process for laying out any other style escapement is closely related: the mechanics of making it, once the basic requirements are understood, are readily modified.

In Part I, *Fig. 1,* the sequence and arrangement of two- and four-toothed escape wheels were illustrated. Compare them to *Fig. 4* in this text and note the essential differences. On the basis of utmost simplicity alone, the 45° (two-toothed) escapement takes top honors. But battery drain during a sustained turn is heavy. A ten-second turn, in addition to using up a good portion of battery life, may also heat the coil sufficiently to fuse any material placed between armature and coil core to counteract residual magnetism—the cure thus becoming worse than the ill. In the event of loss of control this mechanism returns to neutral.

In regard to the 22½° escape action (four-toothed wheel), the best that can be said for it is that it permits a less abrupt change of direction. During the excitement of actual flying, though, those half turns are inclined to confuse a mental picture of the sequence. The next position is never really known for sure. Besides, I don't see that a half turn held for two seconds accomplishes any more than, let us say, a full turn held for only one second. Battery failure or loss of radio contact results in a rudder positioned in either neutral or a turn.

Our 30° escapement's one fault is that in the event of failure it is no better than the 22½° action. Apart from that, it is as simple as the two-toothed wheel. The sequence is always clearly in mind. From neutral (no signal) one pulse is always *right* and two pulses *left,* or vice versa. The neutral (ON signal—between the two turns) may be used for a thermal relay if desired. This is easy to follow in *Fig. 4.* The sequence shown obtains only when the yoke is driven horizontally by the crank pin on the escape wheel. That is, the rudder axis is at right angles to the escape wheel shaft.

Dyed-in-the-wool fractional turn addicts may be happier with the arrangement shown on *Fig. 5.* The yoke in this instance is driven radially from a pivot. The pivot point in the diagram gives a fractional turn at "no signal" and a full turn, "on signal." The difference between fractional and full turn deflection depends upon the distance from yoke pivot to escape wheel shaft. There is no particular advantage to this arrangement, although, like control of a full-sized ship, immediate full control is eased off as soon as change of direction or attitude is realized. I have never tried it in radio control, but it may be quite good. Pivoting the yoke from the bottom rather the top, as shown, would reverse the action: then you would have full control with "no signal," and fractional movement "on signal." Personally, I favor the arrangement in *Fig. 4.*

The detail and assembly drawings of this 30° escapement do not pretend to be completely dimensioned. The drawing was made with the thought of allowing leeway for materials most probably on hand, rather than with any idea that the mechanism would be turned out in quantity to rigid specifications. The prototype of the escapement detailed weighs .42 oz., and it operates faultlessly and positively on one single pen cell. This means a tremendous safety factor when 3 or 4½ volts are used and the return spring tension raised slightly.

Comments on each component going into the complete mechanism will follow. I hope I am not taking too much for granted when tools, somewhat outside the requirements of straight model building, are called for. They wouldn't cost so much anyway: quite a bit less than a commercial escapement of top quality.

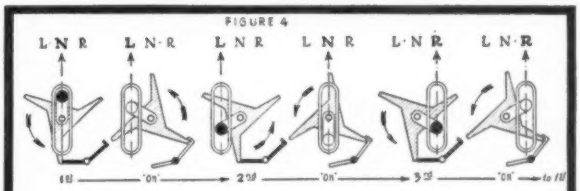
ITEM 1. Most scrap boxes will yield a piece of mild steel of about the right thickness. I fret-sawed mine out roughly to shape from annealed steel strip, with a coping saw fitted with a metal-cutting blade. A fine file thinned out the teeth and brought the outline close to finished size. The shaft hole was made with a No. 50 drill, and a straight length of .041" (No. 19) piano wire forced in. A temporary bearing was made for the shaft and the process of trueing up begun. A smooth Nicholson file, a well-worn file, crocus cloth, and a burnisher made from a crochet hook (borrowed from my wife's sewing basket when she wasn't looking) were used to finish the job. The shaft was bent to form a crank and soldered firmly and neatly into place with plenty of heat and then plunged in water. All traces of acid flux were meticulously removed.

ITEM 2. The only tricky job here is to form the lugs for the pivot. Forming soft iron is very easy, but if steel is used make sure it is properly annealed first. If the material used is more than .04" thick, it should be filed down to size. Accuracy is essential, and finishing the pallets is as important as finishing the teeth of the escape wheel. One desirable feature of using steel as a material is that it may be hardened when the part is finished. Worth considering, even if steel is much less malleable.

ITEM 3. If possible the bracket should be .06", or even 1/16"

(*Turn to page* 54)

FIGURE 4



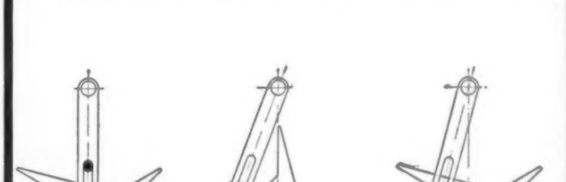


FIGURE 5

Model Jet Engines

by JERRY LEMELSON

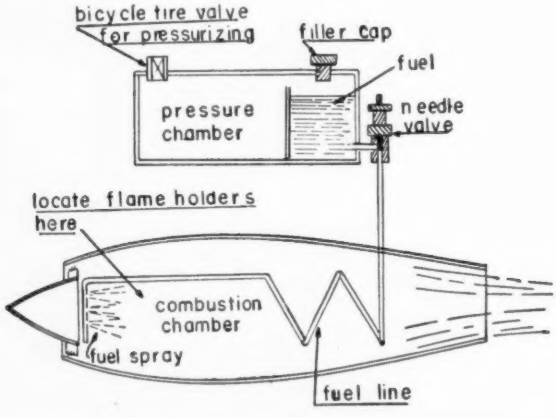
PART TWO

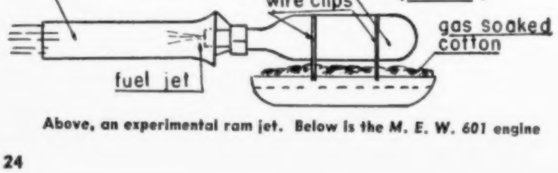
IN THE February, 1950, issue of this magazine, turbo-jet and pulse-jet engines were discussed and examples were given of designs in miniature used in this country and abroad. We now continue the discussion of model jet propulsion with a coverage of rockets and ram jets and what progress has been made with them in the model field. A description is also given at the end of this article of a unique rocket turbine-propeller combination which has been run successfully in England.

The rocket is perhaps the simplest of all jet power plants since, in its basic form, it requires no moving parts to sustain operation. It consists merely of a shaped tube, closed at one end, in which a solid or liquid is burned and ejected at high velocity. The propelling action of the rocket results from the reaction to the rapid escape of gases which are generated when the propellant (fuel) burns. Perhaps the most common example of the rocket to the average modeler is the CO_2 capsule fizzing out its contents after the cap has been pierced. In this case the gas is already under pressure and combustion is not necessary for high-escape velocity. Another example is the common skyrocket fired aloft to celebrate such holidays as July fourth. Thrust results in this particular rocket from the rapid burning of a powder propellant.

The larger rocket motors (those which propel such missiles as the V-2 and American *Viking*) operate on liquid fuels, alcohol for example, which combine with liquid oxygen, or hydrogen peroxide, to generate high heats and pressures. Rockets of this type will not be discussed since they are relatively expensive and dangerous in the hands of an inexperienced experimenter. The early American rocket designers frequently had their liquid rockets explode during the tests which they witnessed at a safe distance. On many occasions, the V-2 missiles exploded during launching operations against England.

The Jetex 350, largest of these solid fuel jet engines





Above, an experimental ram jet. Below is the M. E. W. 601 engine

A slow burning propellant, one which does not generate too high a heat or pressure, is most desirable for model work. Guanidine nitrate fits nicely into the picture. It burns evenly and slowly at a relatively low temperature and yet generates sufficient gas pressure to produce considerable thrust for the weight of the propellant used. The flash point (point at which ignition occurs) is slightly in excess of 350° Fahrenheit.

Bill Wilmot and Joe Mansour, of Southampton, England, discovered the good propelling qualities of guanidine nitrate several years ago and have since designed a number of rocket units which are now available on the market under the name of *Jetex*. The *Jetex* motors are now available to the modeler in four sizes producing ½, 1, 2, and 3½ oz. of thrust. The units are designated model 50, 100, 200, and 350 respectively. Like most rockets, each *Jetex* unit is cylindrical in shape. It consists of an aluminum shell inside which the solid propellant is burned and a removable spring loaded cap which mounts the escape nozzle. The larger *Jetex* units (the 100, 200, and 350) mount coil springs at the head end of the engine which pre-load wire clips. These clips snap over the end cap and hold it in place. The springs also act as a safety valve allowing the cap to come loose in the event that the nozzle becomes clogged and the pressure builds up within the rocket. The specifications of the *Jetex* units are as follows:

Unit	Over-all Diameter	Total Length	Weight Less Charge	Thrust	Duration of Run	Weight of Charge
Model 50	11/16"	1-5/8"	.22 oz.	1/2 oz.	15 sec.	.22 oz.
Model 100	1"	2-1/4"	.625 oz.	1 oz.	20 sec.	.28 oz.
Model 200	1-5/32"	2-7/8"	1.125 oz.	2 oz.	25 sec.	.31 oz.
Model 350	1-3/8"	3-3/4"	2-1/2"	4 oz.	12 sec.	.41 oz.

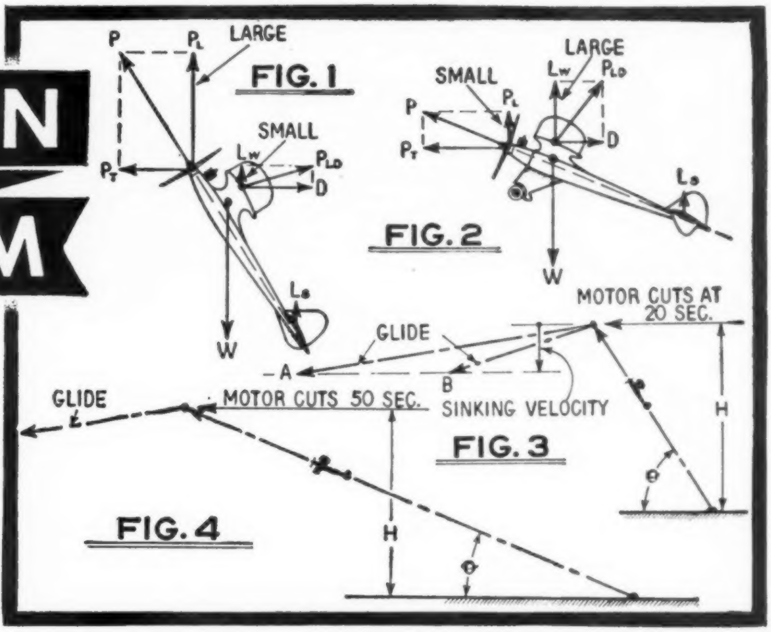
Extra charges of the propellant are available at most hobby shops which sell the *Jetex* units. The larger units may take up to three charges to increase the duration of the run. The *350* will operate in excess of 36 secs., if three charges are used.

A graph of thrust vs. time after ignition is presented on page 38 for a typical run of a *Jetex 100* unit. It can be seen that it takes several seconds for the pressure to build up to where the rocket is delivering its rated thrust of 1 oz. If you use the engine, you will note a delay of several seconds after lighting the wick for the model to get moving. From the graph, it can be seen that the unit delivers approximately an ounce of thrust for the next 15 to 18 secs. after which the thrust drops off suddenly to zero as the charge fizzes out. The *Jetex 350* has been made to deliver as much as 5 oz. of thrust for a period of almost 9 secs. per charge; this was accomplished by enlarging the escape nozzle diameter.

The ram jet engine approaches the rocket in simplicity since it also does not depend on moving parts for operation. Here again, it consists merely of a shaped tube, this time open at both front and rear ends for the admission (*Turn to page 38*)

DESIGN FORUM

by CHARLES H. GRANT



WHY DO I design model airplanes? Have you ever asked yourself that question? Is it for the thrill of seeing a model race around a circle at two miles per minute, responding to the delicate touch of your guiding hand? Is it for the thrill of seeing your brain child climb like a sky rocket to near-invisible heights and then soar gently earthward? Is it for the satisfaction experienced when some official hands you a shiny trophy, or because of the overpowering feeling of mastery that comes from seeing your plane conform faithfully to the flight characteristics that you had carefully planned for it?

It seems that the majority of model builders fly primarily for thrills resulting from action. A minority have the added intellectual thrill that comes from realizing that they have mastered a specific problem of flight; from seeing their model respond exactly as they had planned and knowing from this that they have mastered the design and adjustment problems involved. The purpose of some also is to experiment, to increase their store of knowledge by trying out models of one form or another. Whereas thrills give pleasure, the latter objective increases the store of aeronautical knowledge as well and apparently is more useful and valuable, so we are chiefly concerned with it in this column.

Regardless of their general objective, many model builders have specific minor performance objectives such as speed, duration, stunting (which includes maneuverability), or other types of performance less common. These objectives may be subdivided still further into performance achievement with various types of aircraft, airplanes, gliders, helicopters, autogiros, or other forms. Nevertheless, with all of these, obtaining best results through efficiency, whether it is flight or structural, is the most accurate measure of the model flier's knowledge and ability, because efficiency results from knowing how to put all the flight factors together in a manner which achieves the objective to the highest degree.

There is only one other thing which restricts, determines, or limits the performance of an airplane outside of the flight factors of power, weight, lift, drag and airplane form, and that is the flying rules. These in the past have placed limits on one or more of these factors and in this way they have limited the performance of model planes in various ways. In the pioneering days of gas model flying, the trend of design ran to large planes with considerable wing area and low power compared to weight. This resulted directly from the low-powered engines available at that time, and the desire to create comparatively slow airplanes that would insure a minimum of damage in crashes resulting from improper design. With the passing of time, engines became more powerful for their weight and modelers gained in design experience. Then they became more venturesome. This resulted in smaller, lighter and faster models. Those with an understanding of the factors influencing performance saw their chance for some real contest winners through side-stepping careful aerodynamic designing and substituting a high power-weight ratio. It became obvious practically overnight that nearly infinite duration would result if sufficient power could be packed into a very light airplane. Consequently, duration contests became a test of the art of putting a large motor into a light structure. This relegated considerations of lift, drag and even stability into second place. The idea which dominates full size aircraft, that of carrying the most weight with the least amount of power was "thrown out of the window." Actually, the model became a combination of a sky rocket which could climb to maximum height in 20 secs., and a parachute that would slow its downward speed to a minimum.

In all model duration contests, the greatest duration is obtained by getting the plane up as high as possible and gliding as long as possible. Models with great power and little weight achieve this purpose to the highest degree. In fact, hundreds have disappeared to parts unknown, never to be heard of again. This has prompted development of so-called dethermalizers, which in effect bring model planes closer to our sky rocket-parachute analogy. Under conditions of high power and little weight, models climb nearly vertically and the wing has very little function in respect to climb. (This incidentally answers one of the questions sent to us by Mr. Edward Durkee.) The propeller creates most of the lifting force, Fig. 1. The wing merely serves to prevent torque induced rotation and to keep the airplane on a precise flying course. With dethermalizers operating during the glide, wing efficiency is completely de-

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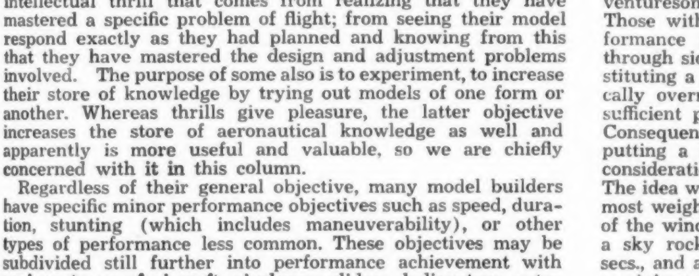
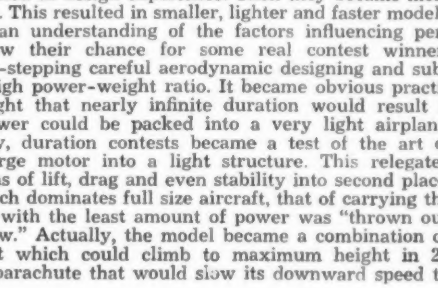
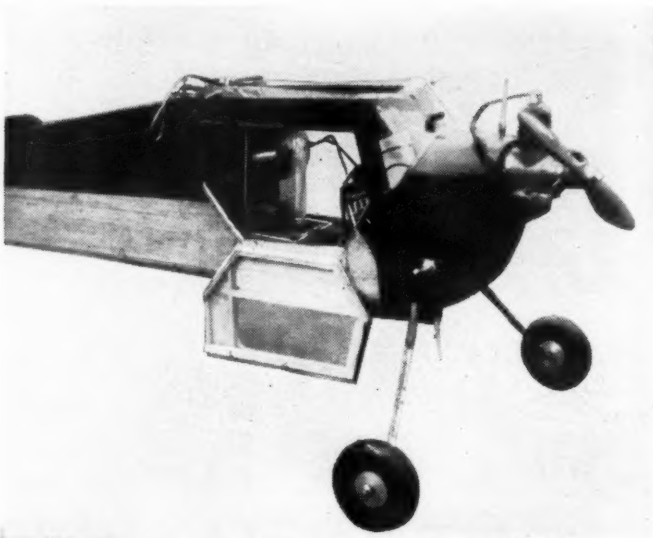

Old-timers in action. Note that this giant canard has three props.


A canard with sweepback and wingtip rudders

The Citizen

by William Winter

PART TWO



The receiver is mounted with square loop antenna at the bottom

IN THE writings of the Good Brothers, Owbridge, Lorenz and others, radio model aviation has a kind of ground course which every new "student" should read. The Goods, interestingly enough, bear down heavily on the flying of the airplane. This is highly significant. Even on rudder alone, steering a gas job where you want it to go is far more of an art than tossing the highest-powered pylon into the air. This is something the writer learned the hard way. Despite an appreciation of the radio man's point of view, it took nearly a year of on-and-off flying to reasonably master the technique of rudder alone.

This technique, from the writer's point of view, consists purely of getting back the airplane after every launch, without recourse to field glasses, bicycles, foot races, and automobiles. It is primarily a matter of experience. Not experience in adjusting a relay or reading batteries, but in knowing from past disasters what is happening when an airplane threatens to get away. Experience in knowing what is overcontrol or undercontrol, and what each can do to you. Experience in knowing how fast to fly and climb and how to do it precisely the same way *every time*, and what the variations can do to you. And, as it is with real planes, your second ship may vary from the first in subtle ways, which, after cases of overshooting and undershooting, and other startling changes, will gradually teach you to judge quickly from the way the ship first responds and handles, what may be expected all down the line. This, to us, is a fascinating new world of modeling.

First, however, some details remain from last month, on the *Citizen*, its construction, and especially on use of the *Citizenship* radio supplied by Vernon C. Macnabb. Since this radio vitally affects both the testing of the *Citizen* and the rigging of the plane, let's examine this particular "electronic co-pilot." Now it will be noticed from the plans that a severe amount of decalage, or longitudinal dihedral, (positive incidence in the wing, negative in the tail), has been used, he experienced model designer may assume, because of the rearward position of the center of gravity, plus this rigging, that the ship is on the borderline of being too heavily loaded. This is a half truth. At the relatively low flying speed under power which has been found necessary to give reasonable alikeness of rudder responses under power and in the glide, the ship has to fly at larger angles-of-attack. This is the equivalent of "slow flight" in a lightplane where, with engine throttled back, and stick partly back to hold up the nose, you cruise easily along at, say, 50 mph. You see, the *Citizen* differs from the real big radio jobs in that the *Arden .199* has a remarkable margin of reserve power for the job on hand. And, if too much power is drawn, and transmitted into forward speed and/or climb, the high speed of the plane immediately steps up rudder effectiveness to the point where the man on the ground can't do more than flip it from side to side to avoid spirals and spins. Painstaking effort was required to learn the speeds, the trim, and the props that give correct results.

This trim is also required because of the unique problems in battery distribution arising with the Macnabb radio. If the Beacon radio was used (the ship was originally designed for such equipment, with the use of large batteries), it would be advisable to move the C.G. more to the rear, removing some incidence from the wing. The plans show removable packing to permit the proper change in incidence. With the *Aerotrol* and its lighter weight, especially in batteries, the wing would be set at a still smaller angle, or the negative removed from the tail. With the latter equipment it should be possible to fly the *Citizen* on a glow plug .09 engine, and remove all risk of improper flight speeds and climb. The combination would be ideal in every respect for the tyro.

In the installation of the test radio, it became necessary to mount the radio well to the rear of the cabin, taking care to keep its very sensitive antenna away from surrounding objects (at least 1/2"), such as wires, switches, etc. At the time it was believed inadvisable—and this has not been definitely cleared up at the time of writing—to place batteries directly beneath the receiver. Most radios use a long antenna running along the fuselage, or back, to the fin; but the small antenna of this radio is no larger than a cluster of batteries. When the ship was directly overhead, it was feared the control might suffer. On the *Citizen*, the cramped experimental vertical mounting of the receiver would not permit such installation of current supply. For these reasons, the batteries were grouped at the front of the cabin, whereas, ordinarily they would be spread out on the floor.

This balance problem was rendered more acute with the discovery (by the manufacturer, our guinea-pig difficulties confirming what was found at the plant) that the original 6-volt A battery made up of four pen cells as a commercial unit, was not reliable, was too difficult to obtain in some localities, and, at best, gave but a few flights. Eventually, it was found that, while flights could be made with four pen cells for A, four intermediate flashlight cells gave reasonable performance. At present, the writer gets somewhat better than one hour continuous operation on these batteries, while the manufacturer finds two hours is the limit before voltage makes reception critical. It was also found that ignition interfered with reception under some conditions, so the coil and ignition battery had to be moved as far away from the radio batteries as the ship design permitted. (The manufacturer supplied a resistor for use in the high tension which eliminated the interference problem.) Actually, these are not real problems. They are known factors to be considered in designing the plane; the resultant C.G. location, in this case, requires the trim shown on the plans when the *Citizen* is flown with the Macnabb radio. Results are perfectly satisfactory.

As the reader probably knows, this particular radio was developed with the aim of obtaining FCC approval of a transmitter that would not require a ham license. The significance of this is obvious. However, the Macnabb radio has so many unique advantages that far outweigh disadvantages, that it would be a desirable unit, regardless of FCC approval or disapproval for license-free operation.

Compensating many times over for its high A power drain is the extremely low B drain, which enables hearing aid B batteries to last practically the equivalent of their shelf life. In the *Citizen*, one set has gone a busy 10 weeks and still reads 60 volts. (For the initiated, milliamp readings are about .1 idle, and 1.2 with transmitter signal switch on.) The total weight, including the four flashlight cell A's, is about the same as

when a big B is used along with small A's. It is unnecessary to touch either the relay adjustment or the tuning. There is no adjusting of antenna length. The radio is manufactured ready to operate; and when it doesn't, return it to the factory. The small antenna on the transmitter eliminates awkward field setups and makes possible the chasing of a plane, perhaps on purpose, for cross country with a car. The transmitter is a small affair that is aimed in the general direction of the ship. All this means that the radio end is reduced to turning on switches, and pre-session checks of batteries and escapement power.

Space last month did not permit a discussion of some of the crucial points in the construction of the *Citizen*. For example, the first step in assembling the fuselage, once the sheet sides and formers have been cut, is to position the formers at the front and back of the cabin portion, gluing them to the sides. The floor of the cabin goes on next. If these parts are drawn with a square and triangle, alignment is automatic. After this has been done, the sides are pulled in at the rear as usual; and from there on, the builder requires no special information. The four corner posts of the cabin (1/2" sq. front—1/4" x 1/2" rear) are dropped in, followed by the cabin top pieces and the V-shaped cabin roof. The nose itself is made by putting on the side blocks first, then the top and bottom blocks, followed by the ply firewall or engine mounting. Before closing in the nose, position coil, tank, etc. with the aid of balsa sheet supports, and complete the wiring. Note that the two corner blocks behind the firewall close in the crevices that show at the bottom of the nose at either side of the firewall. These blocks can be glued onto the two big side blocks before assembly begins. Be careful that coil leads, especially the high tension, is not close to, say, the timer body.

Another point to watch is the escapement rubber-driven motor, which comes forward through holes in the bulkheads. These holes should be made before the fuselage is closed in on the bottom. On the original ship the holes were reinforced with washer-shaped pieces of sheet. The rubber can be replaced at any time with a long music wire hook pushed to the rear from the left side cabin door. An inspection door on the right rear of the fuselage facilitates reaching the escapement hook.

The landing gear is very sturdy; the rear strut extends for about 4" along the fuselage side, fitting into a groove made in the belly block, after the nylon covering is completed. When the gear wire is pushed into position and cemented, a strip of nylon is cemented over it. All joints are double-cemented; that is, the parts are first coated on the intended joints then, when that dries, more cement is applied and the parts are pressed together. This has a very great effect on the strength of the ship and it takes pliers to remove some of the pieces afterwards, although the joints never yield. The nylon covering extends over all wood surfaces and is a design factor in the use of the light sheet sides. *Do not forget this!*

The testing of a radio model is always a problem. Usually, the experts start by telling us the model must fly and glide in equal size circles both in power and the glide. Pride prevents our telling you how long it took the writer to reach such a point. (Incidentally, Walt Good says his *Rudderbug* now flies the way he wants it to, after 110 flights!) The beginner wonders what to do from the instant the airplane is done. Well, what is needed?

The ideal is an open field and a windless day. Given these conditions and you may get to controlled flying in one session. The greatest psychological hurdle is that first hand glide, followed by the first power flight. Fortunately, the *Citizen* is small and tough enough to dive on its nose if the glide trim is bad. This isn't recommended, but since we've done it stupidly a couple of times, the strength of the ship can be vouched for.

As a beginning, remove the prop and prepare for some test glides without radio or batteries. In the event that the ship is rigged for the Macnabb radio, removal of forward batteries will make the machine tail heavy. This means that less flying speed is needed in the glide, a less forceful heave is required, and that the descent probably will be a kind of shallow swoop landing nicely on the wheels. The first glide can be made from an on-the-knees position. How fast to throw it? Imagine that you have an equivalent-sized free flight that is trimmed a trifle fast and that it can be heaved dead ahead with plenty of muscle, nose pointed down a trifle, and aimed at a spot about 25' away, or about 40' if standing. If the *Citizen* glides at all at this stage, you have no worries. If tail heavy, those batteries will bring down the nose. Do not trim but, having gained a little confidence, fasten in the cabin some object of about the equivalent weight of the radio. Also put in about half the battery weight forward. If the model is launched from a standing position, more severely due to the added weight, it should still display a slight floating tendency as its flight path or glide path curves for a pretty landing. Now, if the glide seems dangerously fast, add incidence to the wing. (This may come out later, if needs be, as you get further with the testing.) If it is slightly tail heavy, it is perfectly safe to add all the batteries. It will be reassuring to know that the original was glided with all weights in place with the most nose heavy trim and that the landing gear merely bounced the ship a couple of feet into the air.

If possible, hand glide the machine from a slight rise so that the glide can be studied for distances of, say, 75 to 100'. If you can get this advantage, you will be far ahead on the flight testing, possibly eliminating stalls on short motor runs. To power test, first run up your motor trying to estimate from experience what power would be enough to merely drag the machine through the air. On the original, a timer setting of eight o'clock, with an 11-6 *Pow-OR* prop (other props may give climb so look out), and *Sky Ranger* gas-oil mix, provided level, slow flight. If you have the room, set the flight timer for 15 secs. And running with the plane, supporting it near the rear of the cabin, launch it as nearly in level flight as you can estimate. Do not point the nose up! Try to feel the ship leave your hand; as you push the ship forward from you while running there is a second or so when the machine is in between flying and resting on your hand. It is usually possible at this point to guide the strength of the heave accordingly. Launches depending on pure forward motion of the hand are not recommended on any but small models that become airborne right from the hand. Hard arm-launches frequently result in banked flights one way or the other.

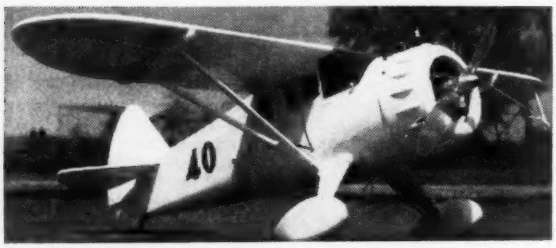
If you estimated things correctly, the model will either drag itself across the field at the height of launch or will descend to the ground with the motor still running, taxiing harmlessly about. The writer prefers the latter condition because it permits gradual addition of throttle to get level flight. Of course, the model might dive too abruptly or it might climb, getting into mushy stall approaches on its low power. If the ship seemed to dive rather than descend in a straight line, increase the incidence in the wing until the short power flights indicate that the right power has been found for preliminary testing. At this stage, the only correction for tail heaviness is downthrust. *Unless you see the glide* it is unsafe to assume that the glide is too slow. If it proves so later, remove the downthrust and take out some of the wing incidence. If downthrust of a maximum of 3/32" (behind the top of the engine mounting ring) does not eliminate the stall tendency, remove incidence from the wing. In the end, your ship probably will require 3/32" downthrust, as measured behind the top of the mount, and 1/32" right thrust.

Now that we have the throttle setting to get short level flights across the field, what are we looking for? Just one thing: is the model flying straight? At this point we can accept a very slight turning tendency of about 25-35' from straight after 250' or so of flight. If the ship tends to turn badly, check the rudder position to see if it is really neutral in "neutral." The flying surfaces, of course, should not be warped and it is assumed that any warps that showed up in construction were removed. A warp is not a disgrace, but it *must* be *removed* before flying! If the rudder is true, and the alignment is correct (a slanted tail will turn the plane toward the high side of the tail; a wing resting with one tip lower than the other will bank a plane), this turn in power flight is corrected by placing a washer behind the engine mount to provide side thrust. When more power is added later, this may have to be altered again. Continue the short low-power flights until you know the ship is sticking reasonably close to the desired straight course and is

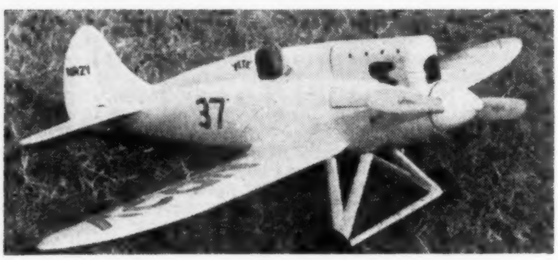
(*Turn to page* 52)

The simple but pleasing lines of the *Citizen* are apparent here

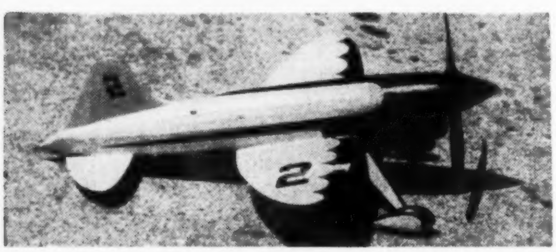
No. 1 Beautiful Wakefield model by Ed Stoffel



No. 3 Highly-realistic *Mr. Mulligan;* Abe Shuster did this job



No. 4 Another Ben Howard design, *Pete;* photo from Ben Hammer



No. 5 This is Joe Ransel's *Pole-Cat,* fitted with wheels

No. 6 Italian speedster of G. Gottarelli has comp. ignition engine

News of Model Plane Experimenters From All Over the World

No. 2 Hideya Ando sent this pic of a *Superfort* model

THE 1950 RULES are of interest to most modelers. Even though the large majority of model builders seldom engage in contest flying, the rules still affect them all, since motors, kits, and many other products are influenced by the current contest rules.

By the time this issue is in print, we believe most modelers will have heard details of the new rules, but for those who haven't, the setup for 1950 is given below. We list only cases where rules have been changed from those in effect in 1949.

Indoor and Outdoor Rubber, Towline Glider: 6 attempts will be allowed to make 3 official flights. Delayed and voided flights count as attempts, with no time recorded. Only 3 official flights allowed.

Outdoor H-L Glider: Contestants will be allowed to use 3 gliders instead of only one, as before.

Free Flight Gas: Motor classes will be—½A, .000-.050 cu. in.; A, .051-.200; B, .201-.300; C, .301-.650. Fliers will have choice of 15-second engine run and hand-launch, or 20-second and R. O. G. H-L time will always be 5 secs. less than for R.O.G. Landing gear requirement is retained for both H-L and R.O.G.

Controline Speed: Any method of launching may be used. There will be a standard wire diameter for each class. Sizes will be announced as soon as established.

Controline Novelty Event: Suspended from official competition until it becomes more popular.

Team Racing: A standardized set of rules is now being set up.

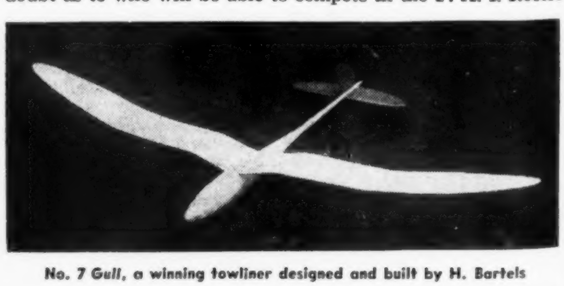
Controline Precision: AMA Contest Board suggests that Contest Directors equalize speed and precision stunt events to allow more equal prize distribution.

General: Every flier must *construct* the model he uses in competition. Average pre-fab kits are okayed, but completely prefabbed models, which can be in flying shape in only a few minutes are excluded. Radio-controlled models are not allowed in regular outdoor free flight events.

That about covers the changes. We learn from the AMA publication MODEL AVIATION, which was our source for this info, that opinions of over 2,000 modelers were weighed before the 1950 rules were established, which certainly makes these rules representative of the modelers themselves.

F. A. I. RECORD ATTEMPTS made in the U. S. in 1949 were successful in several cases, and this country now holds various speed titles, in both free flight and controline. It is now generally known that the F. A. I. Record tries were sponsored by Plymouth Motors, in some cases with the cooperation of the U. S. Navy.

Our January issue carried a general article on F. A. I. records under the heading *"World's Records Are Tough!"* It appears that the last paragraph of this article has left modelers a bit in doubt as to who will be able to compete in the F. A. I. Record



No. 7 *Gull,* a winning towliner designed and built by H. Bartels

No. 8 Close attention to detail is seen in *Tiger Moth* by M. Gordijn

trials to be held at the Plymouth 4th International Meet in Detroit. To set all model builders straight on this, we quote from a letter received from Warren E. Bartlett, Assistant Contest Manager for the 4th International, who writes:

"So far as I know, the F. A. I. Record attempts at the 4th International will be made only by contestants who have qualified through the customary Plymouth Dealer Elimination Contests.

"At trials made outside of Detroit, and on dates other than the International's, the fliers are chosen by a board of experts who select a modeler on the basis of his skill and dependability. As you already know, this is permissible under the F. A. I. rules."

As yet, we have not heard just where and when F. A. I. Record attempts will be made, other than at the Internationals, but we will list these dates as soon as they are released.

MODEL ENGINE MANUFACTURERS, especially those catering to builders of speed planes, have in general discouraged alterations to their engines which are made with the aim of "hopping up" performance. This is only a natural attitude, as countless engines have been ruined by misguided and unskilled attempts at such hopping up. However, one manufacturer not only sanctions certain motor alterations, but has made available a booklet giving many hints on speed flying in general, including a few simple motor changes that have been found practical, by the manufacturer's own tests. This booklet is a collection of speed hints gathered from the top fliers of the West Coast, and readers may procure a free copy by writing to Duro-Matic Products Company, 1039 North La Brea Avenue, Hollywood 38, California.

* * *

Our lead-off photograph this month is a beautiful flight shot of a Wakefield design by Ed Stoffel (137 Quebec Road, Ilford, Essex, England). Mr. Stoffel is well known to English model builders especially in this line of ships. Although he didn't give us any details of the ship illustrated, Mr. Stoffel must be a photo expert, since flying shots as good as this are rare.

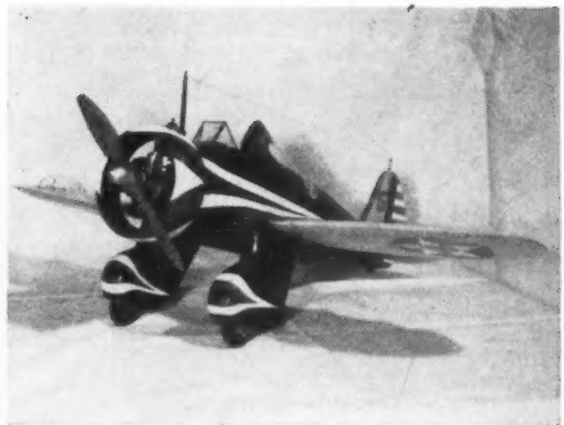
Picture No. 2 was sent to us by Hideya Ando (6126 Asagaya, Sujinami, Tokyo, Japan) and shows a scale *Superfort* constructed by the famous Japanese camera maker S. Mamiya. The four engines were made by the builder and the model has a retractable landing gear and workable navigation lights. The four ignition systems of the engines are synchronized. We understand that the plane is quite a successful flier.

Our third illustration presents a well-known cabin plane *Mr. Mulligan* which is the work of Abe Shuster (4599 Jeanne Mance Street, Montreal, Quebec, Canada) and the photograph was taken by Dave Rosenberg. This ship took about 2½ months to build and is finished with three coats of clear and six coats of white dope which was sprayed on. Power is supplied by an *Ohlsson 60 Special* with spark ignition. Wingspan is 39" and the plane weighs 3 lbs. 8 oz.

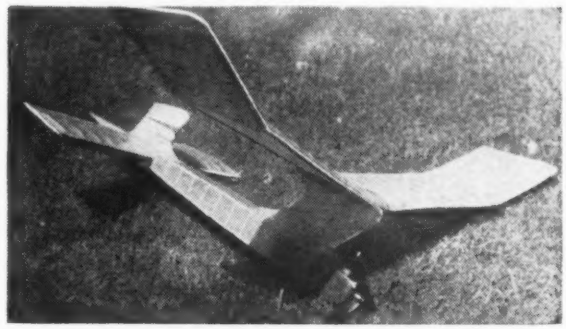
Another Ben Howard design! This time it is his original racer *Pete* which is the subject of picture 4. Here again a super-smooth white finish has been applied by the builder John Tutor, and trim is gold and black. A *Torpedo* engine powers the ship which is a most realistic and smooth flier. This photo was sent to us by Ben Hammer (156 West Arrowwood, Oak Ridge, Tennessee) a member of the *Knoxville Model Airplane Club* and was photographed by F. C. Allen.

An old MODEL AIRPLANE NEWS design, the *Pole Cat*, by Frank Ehling appears in No. 5. Builder A. Joseph Ransel (2713 Kingwood Street, Pittsburgh 27, Pennsylvania) has made a few

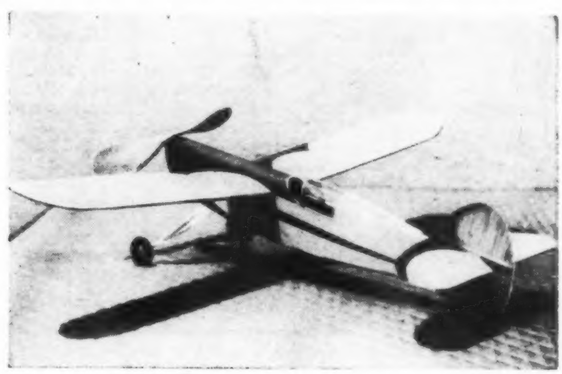
(*Turn to page 43*)



No. 9 Scale P-26A is a rarity these days; by Dick Uppstrom

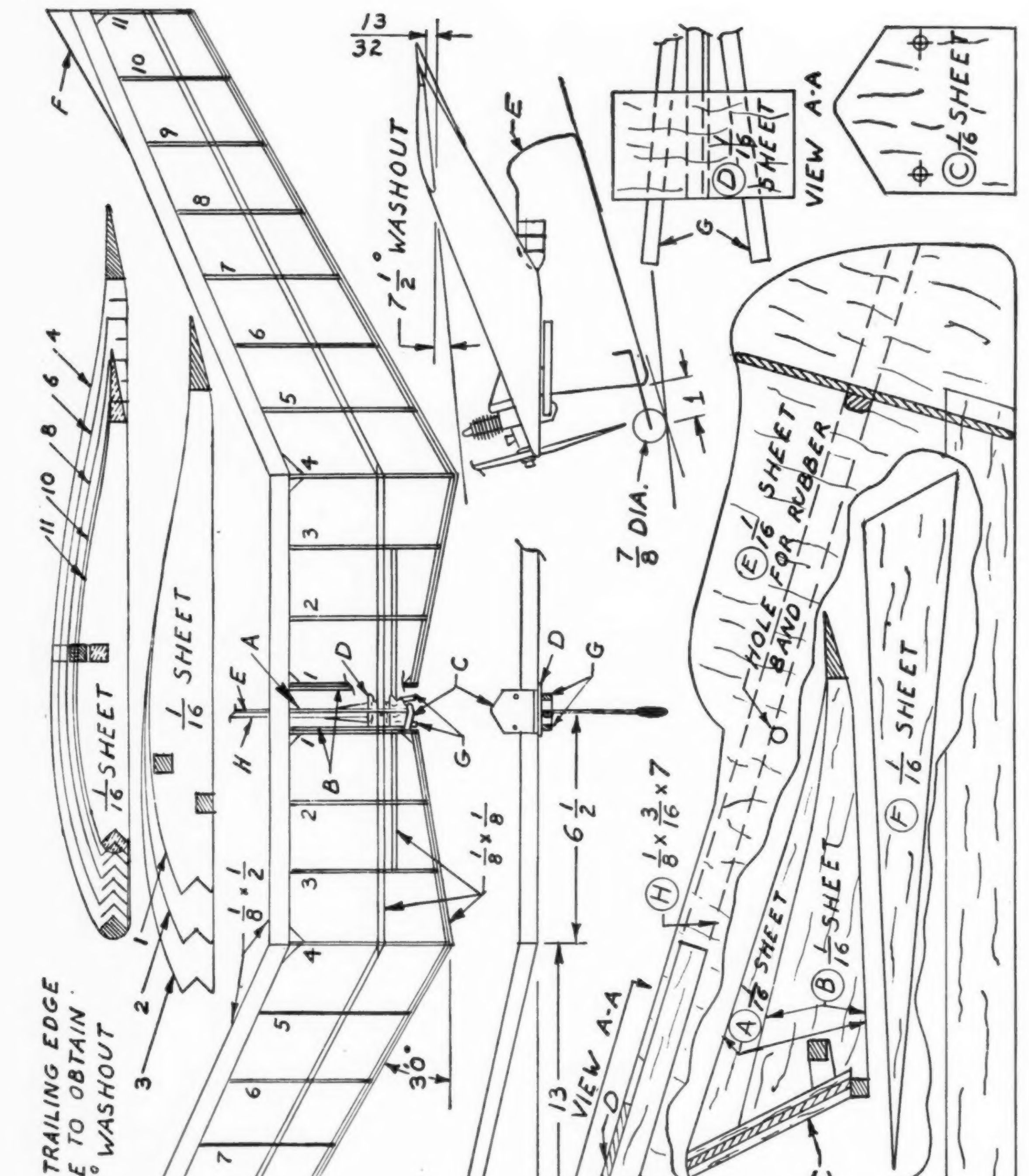


No. 10 The *Hitch-Hiker*, Class A gassie from Richard Hill



No. 11 Dr. J. Simmons designed this attractive mid-wing sport job

No. 12 Real novelty by Dick Schumacher—a low wing R. C. plane


RAISE TRAILING EDGE 13/32 HERE TO OBTAIN 7 1/2° WASHOUT
1/16 SHEET
1/16 SHEET
1/8 x 1/2
1/8 x 1/8
1/8 x 1/8
30°
13
3
6 1/2
13/32
7 1/2° WASHOUT
7/8 DIA.
1
VIEW A-A
VIEW A-A
(D) 1/16 SHEET
(C) 1/16 SHEET
(E) 1/16 SHEET
HOLE FOR RUBBER BAND
(F) 1/16 SHEET
(A) 1/16 SHEET
(B) 1/16 SHEET
(H) 1/8 x 3/16 x 7
(G) 1/8 x 3/16 x 2 1/2
"GULL"
SPAN-39 WT 2.1 OZ.
SCALE - FULL & 1/4 SIZE
Don Broggini

The Gull

by DONALD C. BROGGINI

Here's a model designed especially for the smallest engines

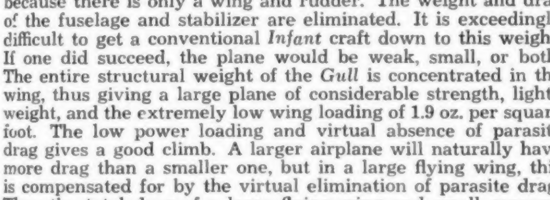
HERE is a ship designed specifically for the *Infant Torpedo*. It is a flying wing, which of course is a novelty, but it is more than that. A few high lights of the *Gull* will convince you of the superiority of a plane of this type over that of the conventional type. The flying weight is 2.1 oz., wing area 160 sq. in., which results in an exceptionally fine glide. This combination of low weight and large wing area is easy to obtain because there is only a wing and rudder. The weight and drag of the fuselage and stabilizer are eliminated. It is exceedingly difficult to get a conventional *Infant* craft down to this weight. If one did succeed, the plane would be weak, small, or both. The entire structural weight of the *Gull* is concentrated in the wing, thus giving a large plane of considerable strength, lightweight, and the extremely low wing loading of 1.9 oz. per square foot. The low power loading and virtual absence of parasite drag gives a good climb. A larger airplane will naturally have more drag than a smaller one, but in a large flying wing, this is compensated for by the virtual elimination of parasite drag. Thus the total drag of a large flying wing and small conventional craft are about equal.

The *Gull* is completely stable in all aspects, being the sixth of a series of flying wings. Three factors are used to obtain stability; namely, sweepback, washout, and a moderately reflexed airfoil. The airfoil is not a heavily reflexed section, which has a poor lifting coefficient, but is a modified Clark Y. This results in a high lifting section, yet one of the stable variety. The handling characteristics of the *Gull* are the same as those of any conventional plane.

You will note that the *Gull* is a tractor. This eliminates: (1) the need for carving a "left-handed" propeller; (2) the difficulties involved in getting clear of a pusher propeller during launching; and (3) the reverse thrust on the motor (which is not designed for reverse thrust).

The *Gull* was entered in the 1949 Mirror Model Flying Fair; after a four-second flight for its first official due to a bad takeoff, the plane, nevertheless, accumulated enough time on its second and third flight to place in the money.

It is not recommended that you power this plane with a motor the size of an *O.K. Cub*, or a *Baby Spitfire*. A 1 oz. airplane behind a motor of such size would prove a bit tricky. The *Infant* is just right.



The *Gull* consumes little time, work, and expense in its construction. The original took only a day to build. All parts necessary to build the plane are shown full size in the plans. It is not necessary to scale up the top view to build the wing. The outline of the wing is sufficient. To obtain the 30-degree angle for the sweepback, measure outboard 13" from the front of rib No. 4, then aft 7-1/2". This will give the front of rib No. 11. Each wing panel is 13" long. The distance between ribs No. 1 is the width of the firewall C. The distance between all the remaining ribs for both center section and outer panel is about 2" when measured along the trailing edge.

The first step is to cut out the ribs from 1/16" medium soft sheet. Ribs Nos. 5, 7, and 9 were omitted for the sake of clarity, but they may be approximated very accurately. Use 1/8" square hard balsa for the wing spars, and leading edge. Shape the trailing edge from 1/8" x 1/2" medium hard balsa.

Let us begin with the center section. Lay down the trailing edge in such a manner that the upper surface is horizontal, and also lay down the lower spar. Now add ribs No. 1 through No. 4, the leading edge and the main spar. The outer panels are constructed in similar fashion except that they have washout. Lay down the leading edge and trailing edge, cementing lightly at rib No. 4. Now block up the trailing edge 13/32" at rib No. 11 as noted in the plans. This will give the required 7-1/2° washout in the outer panels. Add ribs No. 5 through No. 10, and the main spar. Since the wing has a twist in it, the spars and trailing edge should also twist. However, if the notches in the ribs for the wing spar are made oversize, the spar may remain straight and the rib twist about the spar. Cement these joints well. To obtain a twist in the trailing edge, twist the wood a few times to put a permanent set in it. The technique for building washout into the wing should afford no difficulties. After the wing has dried, remove and add the dihedral by blocking each tip up 3". Cement all joints well and add a few extra coats at the wing breaks. Do not forget to fill in the opening in the ribs caused by the deep set main wing spar.

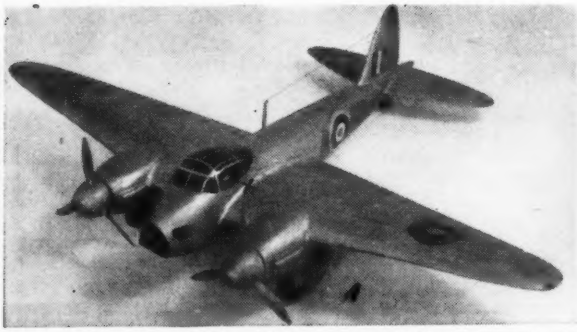
The nacelle consists of formers A and B, and firewall C. Make them from medium hard 1/16" sheet balsa, the firewall being composed of three sheets of 1/16" balsa cross-grained. Fasten formers B to the inside of ribs No. 1, then cement firewall C in place. Now, add former A, and cement all joints well. When dry, bolt the motor in place, being sure to put washers on the backside of the firewall to prevent the nuts from sinking into the wood. Cement the nuts in place.

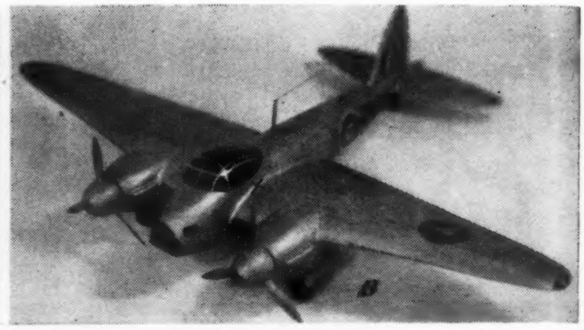
Cut elevators F from medium balsa and attach to trailing edge by cementing, or by soft aluminum hinges as you prefer. Add 1/16" sheet gussets to ribs Nos. 1, 4, and 11.

The rudder consists of D, E, G, and H. Make D and the lower portion of E from hard 1/16" sheet balsa, and the rest from medium. The grain runs vertically on E except for the lower portion where the grain runs horizontal. Cement H and D onto E. Add both G's as shown in view A-A, being sure to have room for the tank which comes down between them.

The landing gear is composed of a 7/8" dia. balsa wheel made from two sheets of hard 1/16" balsa cross-grained. Tubing or small washers cemented to the wheel make good bear-

(*Turn to page 50*)





Picture at left was shot at F/45—notice good over-all focus. F/8 was used at right—tail is very fuzzy

Model Portraiture
PART FIVE

by RAY RUSHER

AFTER setting up the model support, drawing down the background shade and placing the lighting equipment and camera, pose your model and turn on the subject and auxiliary lights. Observe the subject in the view finder and move the camera toward the subject until nearly the entire view field is filled. Leave enough margin around the subject so that there won't be any cut-off of details, such as a wingtip.

The best placement for the two subject lights is to have one near the camera lens but slightly above and behind it, and the second on the opposite side of the camera at an angle of 45° to the first (main) light. Both lights should have the same wattage; and the second one, in order for the lighting to be balanced to best advantage, should be closer to the subject and above it to simulate mid-day sun lighting, which usually shines downward at a considerable angle.

There is a definite mathematical relation between the distance from each light bulb to the subject, the ratio being $\sqrt{2}/2$ or .707 (8-1/2" to the foot). For odd inches or feet, the back of the exposure slide rule can be used for calculation, the value .707 being indicated on the stator and the scales on the slide being read as inches or feet.

In addition to correct light balance, the lighting arrangement suggested will always insure against any appearance of flatness, that is it will produce a maximum of perspective appearance in the subject, which is brought out by the shadows resulting from proper light balance.

The lighting of some subjects, especially those of intricate shape, may be improved with the use of one or two, and sometimes three, auxiliary lights. Experiment with light placement and change the angle of the subject to get the best effect, always viewing the subject from a position as near as possible to the view finder. You will soon discover how to make the subject "stand out" from the plane of the picture.

Shiny surfaces that reflect light into the camera lens should be avoided by slight changes in the angle of the subject or the lights. Any reflection that still gives trouble can sometimes be toned down by rubbing the shiny spot with putty, or dusting with talcum powder.

It is also a good idea to provide a lens hood to prevent stray light from the lighting equipment striking the lens and causing lens flare. One can be readily made, a turned wooden cylinder to slip on the lens rim and another to slip on the portrait cone being suitable. Paint the inside flat black. As an alternative, a strip of black paper can be formed into a cylinder and its ends connected together with gummed paper. The hood should extend as far forward as possible without cutting off the corners of the picture. It is an established fact that sharp contrast between the light and dark portions of a negative will produce a superior print; a lens hood will help considerably in this respect.

While flat lighting for the subject is undesirable, flat lighting is needed for the background. The background lights should therefore be placed symmetrically, a set of two on each side of the camera axis, and both sets should point at the *same* angle (about 45°) toward the background to illuminate it evenly over the entire area that shows in the picture behind the subject. The background has to be lighted more brightly than the subject to prevent the auxiliary lights from casting shadows of the subject on the background. This usually results in poor balance between the subject and background lights, the background lights being too bright in proportion to the subject lights, which results in too much "back-lighting" effect. To overcome this poor balance, shoot one-half or one-fourth the total exposure period with the background lights off. After examining a few prints with full and partial timing for the background lights you will learn to judge the proper percentage of time they should be off during exposure.

With some subjects, especially those where the camera is 6 or 7' from the subject, the background lights produce best results if turned off for three-fourths of the exposure period. At the other extreme, if the subject lights are so close to the subject when taking a close-up shot that the shadows can't be eliminated, the subject lights can be turned off at the end of the exposure period and the background lights kept on during further exposure. Another trick consists of exposing without background lights for the period indicated on the slide rule and then giving a separate exposure with only the background lights on.

During the use of the view finder, disregard distance from camera to subject until after the subject is the proper size in the view finder. Then, using the tape, measure to a point about one-third of the way in from the corner of the subject nearest the camera. This is the best point to focus upon and if this point is used, you are most likely to obtain satisfactory focus over all as the depth of field behind the plane of sharpest focus is about twice the depth in front of this point.

Next, using the proper lens combination for the distance measured, set the lens of the camera at the proper notch on the focusing scale in accordance with the chart which you made when focusing your card on the ground glass (see Part Two).

(*Turn to page 48*)

MODEL PORTRAIT RECORD

Sheet 3

PIC NO.	CAMERA ADJUST LENS	STOP	SCALE	SUBJECT TO LENS	LIGHTS Watts	An. Ft.	EXPOSURE S.R. Sec	ExF^2	ExF^2	= Sec	SUBJECT etc.
Date 9-17-49					Roll No. 8						Film Type SXX
1	1	45	3	21 3/4	150	2	7	1.4	x	10	15" Solid Mosquito
2	"	8	"	"	"	"	x	x	x	3/8	Same-except at f/8 = 1/32 exp. of f/45 = 3/8 sec. (Paper Punching)
3	2	32	15	10 1/8"	150	1	1 1/4	1.0	x	1 1/4	Drone Engine with Swivel Tank for Inverted Flying
4	0	45	3	35"	125	3	16	1.4	1.4*	25	Stunt Fireball * Red = ExF^2 of 1.4
5	"	"	"	"	"	"	"	"	"	"	Same-except background lights off 1/2 exp. time (Paper Punching)
6	2	32	1/00	10 1/2"	125	15"	2	1.0	x	2	Tip-Back Engine Mount-Double Exp.-1 1/2 sec. down + 1 1/2 sec. back
7	0	45	3^3	38"	150	3 1/2	17	1.3	.8*	18	TC-2 Trainer * Blue = ExF^2 of .8
8	2	45	3^6	8 3/4"	175	15"	3	1.3	1.7*	6 1/2	U-Reely Line Meter * mostly black = ExF^2 of 1.7

Example of a picture record sheet for model portraiture

Theory vs. Test Flight

by KEN WILLARD

A tricky twin float seaplane

WELL, here we go again. Not so long ago, observing the growing animosity between free flighters and controline artists, this writer sat down and put forth a couple of comments regarding the squabble. MODEL AIRPLANE NEWS published those views, and it was gratifying to hear from several modelers who repented their individual feelings and decided to try the other fellows' sport. I may be wrong, but it seems to me that I see more fellows flying both types of models now, and learning the pitfalls and problems (along with the pleasures) which accompany both free flight and controline flying.

Naturally, the biggest single contributing factor in the revitalization of free flight has been the introduction of the midget motors like the *Infant*, *Cub*, and *Spitfire*. They did away with the controline enthusiasts' big arguments that (1) it was discouraging to build a model, then have it crack up on the first flight before adjustment was complete, and (2) if the free flight model flew well, it went out of sight and was lost. Now, the small gassies can wind up on a wing and cartwheel across the field on a test flight; yet they are so light that only superficial repairs are required. The next flight can be made with a slightly different adjustment only a few minutes later, instead of a few weeks later following extensive repairs. (Of course, the thoughtless ones will still lose their models if they insist on full tanks *without* dethermalizers.)

Anyway, a lot of controline enthusiasts are trying good old free flight for the first time, and vice versa. In the process, the initial stages of controline flying are simpler than the first phases of free flight—you can even get an expert to help you do your first controline flying—and the controline boys who are trying free flight are being initiated into the mysteries of stability about three axes instead of one.

Being good modelers, they are reading the articles about stability as they try out free flight for the first time; and, I venture to say, in the process are becoming sufficiently confused to wonder if maybe they hadn't better go back to good old controline after all because there's so much disagreement about what makes a good free flight model behave as it should, instead of winding up in a ball. Look at what they have to face—center of lateral area, fin area, fin placement, thrust line, gyro precession, and so many other ideas that it scares even an old-timer from trying anything! We used to get some pretty good flights out of airplanes that would hardly pass the preliminary requirements of some of the theories being expounded today. Now, after following the rules to the letter, lots of chaps are watching their pride and joy hit the dirt with a vengeance, and wondering why—then some expert comes along and says "Sure, you had the fin set right, but you never should have tried to make it turn to the left!" Once again—in my book—an airplane isn't much good unless it will turn left, right, fly straight, and glide either in a turn or straight ahead—all depending on *how you want it to fly—not how some theory says it must fly.*

Give us a for instance, you say. Okay. Recently I read an article about gyro action in propellers, where nosing up tendencies are created in left turns, and nosing down in right turns. It was a very impressive article—and probably a lot of newcomers read it with awe and have since tried to fit their models' flight patterns into the theory. I would be interested to know, though, how many of them will duplicate the fin area and location, because if they don't, they will still be wondering why their model, in a tight left turn, didn't nose up like it was supposed to. Instead, it just kept going faster and faster, the nose went down, and BOOM! Back to the workshop. All because the fin area was enough to overcome the gyro precession action. Hm-m.

Another case history. You read about torque; the propeller turns right handed—counterclockwise rotation, so the airplane tends to roll in the opposite direction. Then you complicate it with a discussion of the vortex flow behind the prop—the air travels in a spiral, goes

(*Turn to page* 36)

Here's a real dream ship in model form

". . . It won't know it can't fly in a left turn . . . !"

ARDEN SPINNER

by Bruce Wennerstrom

AMONG the hottest little jobs flying in the Class A field are Ray Arden's .099 and .199 brain babies. Unfortunately, though, while they're phenomenal on the power side they're not so easy when it comes to the streamlining angle. Cowling an *Arden* in a sleek controliner is no easy trick. It has now become practically standard procedure to file off the tank skirt and bell-mouth mounting flange if the engine is to be used for controline work.

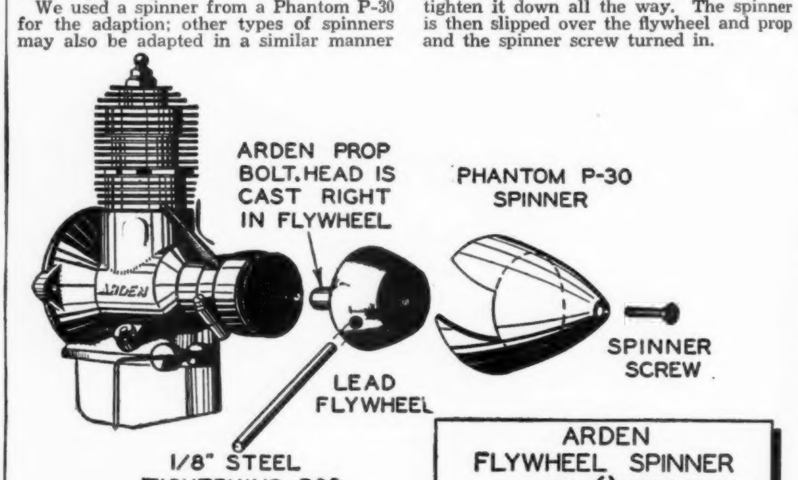
Definitely *not* standard, though is fitting a spinner to an *Arden*, since commercial spinners are not generally adaptable to this engine due to the unconventional method of bolting the prop in place. Here then is a flywheel spinner the author originated several years ago for his own *Arden*.

We used a spinner from a Phantom P-30 for the adaption; other types of spinners may also be adapted in a similar manner however. Briefly the procedure is this:

Fill a small box with earth and with the spinner screw in position, push the point of the spinner about 5/8" down into the earth so that it remains upright by itself. Melt a small quantity of lead in a ladle and, holding the *Arden* prop screw in line with and just touching the Phantom spinner screw, pour the molten lead into the spinner until it flows out of the prop cutouts in the spinner. Let the lead cool, then unscrew the spinner screw and the lead flywheel with the *Arden* prop screw cast into it can be removed from the spinner.

This flywheel now takes the place of the *Arden* nosepiece or washer. File the back face of the flywheel flush with the prop blade cutouts in the spinner and drill a 1/8" hole in the side of the flywheel.

To mount a prop, you slip it on the crankshaft, finger tighten the flywheel, insert a 1/8" steel rod in the side for leverage and tighten it down all the way. The spinner is then slipped over the flywheel and prop and the spinner screw turned in.



Fiat G.46

(*Continued from page 21*)

struts also characterized the Ansaldo fighter, from which the C.R.32 was descended.

Fiat contributed two aircraft to World War II, both of which proved of only minor importance. At the time of Italy's attack on France, the Fiat G.50 low-wing monoplane fighter was in service but its inferior performance quickly relegated it to training duties. In contrast, however, was the Fiat R.S.14 four-place, twin-float, twin-engine reconnaissance machine, which served during the Italian campaign and survived to fly with the unique Co-belligerent Italian Air Force, which collaborated with U.S. and British Air Forces in the attack on German shipping and retreating armies.

Since the end of World War II, Fiat has quickly restored its activities and is today the largest producer of aircraft in Italy. Its principal product is the 30-40-passenger trimotor G.12 air liner, which is being produced for Italian air lines. In addition, the Fiat G.55 single and two-seat fighter-trainer is being delivered to the Argentine Air Force.

And, so it is with a long history of experience and acomplishment that Fiat offers the G.46 sport trainer, our *"Plane of the Month."* Fiat engineers designed the G.46 to a very detailed list of requirements, it is not simply another design that is "tossed out" into the market to see what happens. Fiat is well aware of the situation in the personal aircraft field described previously. It characterizes existing personal aircraft as simply very small transports used to carry people from one place to another. Such aircraft are low powered and although this makes them economical to operate it prevents their being stunted, raced or "sported" with. The Fiat G.46, on the other hand, is designed specifically for acrobatics and high performance and, therefore, fills a unique place in the private-owner market.

The most significant feature of the G.46 is its power plant: a huge DeHavilland *Gipsy Queen 30* in-line air-cooled engine delivering 250 hp for take-off and sea-level operation. This is considerably more power than is available in any private-owner aircraft now made in the United States and, consequently, places the new sportster in a class by itself.

Built around this powerful engine is a neat and trim structure of classic pursuit-plane lines. It is an all-metal low-wing monoplane of thoroughly conventional construction but which makes for economy of production, a minimum of maintenance and very high performance. The wing is built in five sections, a center section integral with the fuselage, two outer panels and two removable wingtips. Two main spars are used and formed metal ribs complete the structure. The skin is flush-riveted, a most unusual practice in personal aircraft. Flush position lights are mounted in each wingtip with formed transparent covers moulded to the wing profile. The ailerons are mass-balanced and feature all-metal structure with fabric covering. Regular combat aircraft flaps are mounted on the wing trailing edge through a continuous-type hinge. The flaps are hydraulically operated.

The fuselage is built up on a series of flanged bulkheads and formers with extruded longitudinal stiffeners. Heavy longerons are carried at the four corners of the elliptical cross section. The passenger and pilot are mounted tandem and are covered by standard transparent hatches. The portion over each cockpit opens to starboard through a roller and channel system which permits the port side to slide up and over. Both hatches may be jettisoned in emergency. Dual controls are provided and a simple stick and rudder bar arrangement is used. The control linkage from the cockpit

to the elevator is by rigid aluminum alloy tubing; connections to the rudder and ailerons are by regular aircraft steel cable. Adjustable metal trim tabs are mounted on the elevator and rudder to permit adjustments of aircraft trim on the ground only. The engine is mounted on two independent supports running longitudially on either side of the engine, each support attached to the firewall by only two bolts. Standard rubber anti-vibration bushings are mounted in these bolt fittings.

The De Havilland *Gipsy Queen 30* is a six-cylinder, inverted, in-line design cooled by air from the nose intake below the propeller. The propeller is a De Havilland two-blade constant speed design. The fuel system consists of a tank in each wing and has a total capacity of 42 U.S. gallons. These fuel tanks are removable through large doors on the lower surface of the wing. The oil system includes a tank with a capacity of about 5-1/2 U.S. gallons and a standard oil cooler mounted within the engine compartment. It is interesting to note that this is a much larger oil capacity in relation to fuel capacity than is used in this country, indicating that Fiat has gone to great pains to insure safety of the engine during high-performance operation.

The main landing gear is fully retractable by hydraulic operation. It folds inward and up into recesses provided in the wing leading edge near the fuselage. The wing features a noticeable sweep forward from the landing gear trunnion inboard to the fuselage to accommodate the retracted gear. Tail wheel is steerable. The brakes use compressed air for operation and have a "double lining" to insure long life. It seems strange, with a hydraulic system in the airplane (for use of gear and flap operation), that hydraulic brakes were not used, thereby eliminating the need for the extra air system. However, gear and flap operation require only very low pressures, whereas a fairly high pressure system would have been required for the brakes; and the air system is able to supply these high pressures quickly and dependably.

An electrical system is available for ignition, cabin and wingtip lighting, cabin heating, and for powering radio equipment if desired. A vacuum system is provided for the operation of the gyro instruments.

The Fiat G.46 has a wingspan of 34' 1-1/4" and is 27' 10" long. It stands 7' 10" high. Its empty weight is 2,110 lbs. and its gross weight is 2,815 lbs., giving it a useful load of 705 lbs. With a wing area of 172 sq. ft., this is a wing loading of 16.2 lb./sq. ft. and a power loading of 11.2 lbs./h.p.

And now for the news you've been waiting for: the Fiat G.46 has a top speed of 200 mph and a cruising speed of 160 mph. One of its outstanding performance features is its climb. It can reach 2,500' in 2 min.; 5,000' in 4 min.; 10,000' in 9 min. and 20,000' in 30 min. It has an absolute ceiling of 24,500'.

With 36 gals. of fuel and 4-1/2 gals. of oil, pilot and passenger aboard, the G.46 has a range of 500 mi. at cruising speed. This represents just over three hours of flying and, making one fuel stop, a trip of 1,000 mi. can be covered in slightly more than 6 hrs., or just about air line time in a DC-3.

Fiat states that the G.46 has a safety factor of 12, which is the same as recent U.S. Air Force and Navy jet fighters, so there is no doubt whatever that any acrobatic maneuver of which the pilot is capable can be withstood by the G.46.

With its high speed, high ceiling, good range and great acrobatic strength, the Fiat G.46 fills a unique niche in the personal aircraft line-up; and for those who want flying in the old-fashioned thrilling way, this is certainly the airplane. Obviously, it is impossible to discuss price on the new sportster due to international exchange difficulties but it is certain that Fiat and Italy would welcome sales of this exciting high-performance aircraft to U.S. customers and would provide real bargain prices for the purpose. The combination of a high value of the U.S. dollar, Marshall Plan pressure for foreign sales by Italian industry and the fact that there is nothing like this airplane available from U.S. manufacturers, all combine to indicate substantial opportunity for the Fiat G.46 in this country.

Springfield Trophy Winner

(*Continued from page* 11)

at each end. Place cap and bearing on front end, and install rear end bulkhead about 1/16" from the end. Cement rear rubber hook. Make tail boom form out of hardwood and form the boom in the same manner as you did the stick. Insert finished tail-boom into rear of motor stick and cement.

Tail Surface. Sandpaper 1/16" medium sheet to thickness shown on drawing. Cut in strips and soak in hot water, then bend (under tension) around wing-tip form. Dry thoroughly, and then cement ribs in place. Cover with microfilm. Make rudder, cover it with film, and mount on rear of tail. Be sure to mount tail off-center as indicated in front view drawing.

Wing Construction. Lay out full size wing plan on cardboard (or 1/16" plywood) template and notch it for ribs as shown in sketch. Make the main wing spars first by sanding 1/16" medium sheet balsa to taper from .050" at center to .035" at dihedral point, where the spar ends. Use a steel straight-edge to cut wood as shown in cross sections. Butt joint two spars at center to form one straight spar and let dry. Make front and rear spar identical. Sandpaper a 1/16" medium sheet to sections indicated for wingtip. The center of the sheet is sanded thin for smallest tip section. Slice off strips to make tips; wet these and form them; then let them dry over a gas burner. Cut wing ribs from either 1/64" or 1/32" medium balsa with metal or plywood template. Place wing spars in the wing template and hold them in place with scrap pieces of balsa, the latter in turn held by pins. These precautions prevent the spars from being injured. Place the dried-out wingtips in place, and secure in the same fashion as you did the spars. Cut ribs to fit and cement in place. After your "Mike" has aged in a dustless place for at least a week, cover the wing in one piece. (Note: Always let microfilm dry at least a week before using it.) Notch spars and form dihedral as shown. Pass over light heat to remove wrinkles caused by bending. Cement the wooden brace on top of the wing for wire bracing. Secure wing on a flat surface while cementing the top brace wires in place.

Flying. Assemble prop, motor stick and tail, and rubber. Find the C. G. and install a paper tube wing socket 2-1/4" in front of this point. Then cement the rear paper tube in place. Set model on a flat table with the tail surface overhanging for clearance. Insert wing struts in the two paper tubes, and cement the wing on top. Support it at the dihedral points with sticks or blocks, until cement dries. Finish the wire rigging.

Warp some wash-in on left wingtip. Try several hundred turns for your first flight. Change incidence of the wing to make adjustments. The wing is shown mounted directly over the center of the struts laterally. The model will circle tightly, when assembled this way, for a low ceiling. For high ceiling flying, the wing may be mounted 5/16" off center to left, as seen in front view. Use less wash-in and fly in larger circles. You should obtain about 13 min. on 1,000 turns when model is adjusted right. Then work up slowly to maximum winds, and you will be in the winners' circle!

Theory vs. Test Flight

(*Continued from page* 33)

around the fuselage, underneath it, pops up on the other side and hits the fin, making the airplane turn to the left. This you can avoid, says another expert, by lowering the fin. Then the air rides over the top of the fuselage and hits the fin on the right side, making the airplane turn right! Finally, just so you won't get the idea this is all simple, another expert comes along and says "Increase the fin area and it will turn left; reduce it, and the airplane will turn right."

By now you are reeling; you wish the "experts" would go away, but no, here comes the final blow as the professor from the speed versus fin area school expounds solemnly "Only if you reduce the climbing speed can you expect a right turn."

Did I say final blow? Excuse me, this fellow here just came in; he says you can fix it all up if you'll "just add a little left-thrust." Or was it right-thrust—or down-thrust? Hm-m-m, again.

What does it all add up to? Just this—undoubtedly there is a certain amount of truth in each theory, but when it comes to the practical application of those theories, that beautiful model that you've just finished will be under the influence of every force which has been mentioned (and many others besides) unless you happen to have struck a happy balance among them all. Once again it will be a case of one force overcoming the others. Your big hope is that the right force will prevail. Contrasted to your hope is the big failing of the various proponents of all these theories, in that they refuse to recognize the counteracting influences which may render their own particular ideas completely ineffectual in different designs.

Then what is the answer? Simply, it boils down to two words—*flight test.* If you have disastrous arrangement of surfaces which no amount of adjustment will overcome, then you might as well admit it—you've strayed too far from the known facts. And if you want to continue experimenting, you had better revise your design to incorporate some of the established relationships. But if you've stayed within the limits of good design practice, adjustments can always be made so that your model will fly, and fly well, in the manner in which you want it to. If you find the airplane noses up too much under full power in a left turn, due to precession, you don't have to give up unless you want to. A little more fin area at the top of the fin will overcome the tendency. Or, in a right turn, you can alter the thrust line. There are virtually an infinite number of ways in which you can change the flight paths of model airplanes to suit your own desires.

So, the moral of this little treatise is pretty plain. Don't let all this conflicting theory scare you out. Contrary to what you may think, free flight modeling does not need a complete and thorough knowledge of all the theories in the initial phases of the sport. Just be conservative. If you don't know anything about it, buy a reliable kit from one of the model companies and follow the directions. You'll be amazed and pleased with the ease of construction as well as the results. With moderate care in workmanship, and flight testing by easy stages from gliding up to full power, you'll learn enough to make the necessary adjustments. After you've got your job flying well, you can make some experimental changes in the settings and *watch* the results. In fact, the chances are that your model will do something at one time or another that is completely unexpected. Maybe you'll try it once more, and it happens again. Nobody ever told you about this! So you study the motion, figure out a plausible reason, and before you know it, your theory will appear in MODEL AIRPLANE NEWS—another contribution to the science (???) of flying models. But don't blame me —I'll be having some fun with another sport design that for some reason or other seems to do a pretty good job of flying, because I will have hidden your article so my model won't know that it can't fly in a left turn with the engine mounted on a pylon above the wing like that—especially with right thrust! Not knowing any better, it will be up there circling around lazily to the left, then coming in with a nice straight glide when the engine quits. Honest. I have a seaplane that does just that.

Anyway, build your models, and I'll build mine, and we'll exchange a few ideas, but don't let the experts scare you. Go ahead, try that ship. Let the test flights determine which theory best fits your design. Remember this—even the greatest designers of full-size airplanes have to submit their ideas to test flights, and no design has yet come forth which didn't show improvement after the tests indicated what small modifications could do to improve the design. That's *progress!*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Model Jet Engines

(Continued from page 24)

of air and the expulsion of escape gases. The tube is so shaped that the high velocity air entering its front end, or intake duct, is diffused to create an increase in static pressure. Fuel is then mixed with this air and burned. The net release of energy as the result of the combustion and the ensuing expansion causes the hot burning gases to escape through the tailpipe at high velocity. The ram air (high velocity air) at intake builds up a cold front ahead of the flame, and prevents combustion from proceeding in that direction; hence the hot gases cannot flow forward through the inlet. Most large scale ram jets cannot operate efficiently at air speeds below about 300 mph. Model ram jets are, however, similar in many respects to the gasoline blowtorch and may be run statically. At zero speed they have practically zero thrust, but thrust will increase as the forward velocity of the unit increases.

We illustrate herewith a typical model ram jet. The design is similar to a series of ram jets which were constructed by Sgt. G. A. Henwood during the war in England. The last of Sgt. Henwood's jets, on which data is available, weighed 6 oz. and ran for periods of 60—90 secs. at speeds of from 15 to 20 mph. Tests were conducted with the jet mounted on a rotating arm.

Referring to the drawing, we see that the engine consists of two main units, a fuel tank and a combustion chamber. A one-way bicycle tube valve (A) is welded to a fuel tank (B) for pressurizing with air. The fuel is preheated before being burned by introducing the fuel line into the combustion chamber near the exhaust end and coiling it next to the walls of the chamber as shown. It then flows to the head end of the engine where is sprays into the chamber through small orifices in the tubing. No dimensions are available on the drill sizes for these holes or, for that matter, on any of the other dimensions of the engine. If the reader plans to experiment with model jets and to develop his own fuel metering systems, it is suggested that drills in the range of numbers 70—80 be used. In ram jet design, both fine atomization and complete distribution of the fuel throughout the combustion chamber are necessary. You might also try using a flame holder behind the point of fuel introduction similar to the same device used on the large scale ram jets. In its simplest form, the flameholder may consist of strips of stainless steel sheet bent into a V cross section and extending across the combustion chamber with the apexes of the V's facing the intake end.

Getting back to Sgt. Henwood's ram jet, we see that fuel is poured into the fuel tank and held there by closing down the needle valve while several pounds of air pressure are applied to the reservoir above the fuel level, by use of a small hand pump. The flashback arrestor in front of the fuel orifices is used to prevent flame flashback through the head end of the engine during starting. It also serves the purpose of streamlining the intake for the smooth admission of air. Starting is acomplished by opening the needle valve and applying a torch to the exhaust end. (For dynamic testing, the engine was mounted on a free rotating arm). After the needle valve was adjusted for optimum burning, the engine was given a starting push whereupon it picked up speed until it was soon spinning on the stand at its maximum speed.

A model ram jet is available on the market today. It is the *M.E.W.* (Minnesota Engine Works) *Model 601.* The engine is similar in many respects to the ram jets of Sgt. Henwood, consisting of a gas tank and a combustion chamber in which fuel is burned and expelled. The arrangement of these components is different, however, with the tank mounted in tandem and ahead of the combustion tube. The tube, or tailpipe, consists of a 3" length of 5/8" thin walled steel tubing and the gas tank is an empty CO_2 cartridge with an elongated exhaust neck. A brass metering nozzle screws into the exhaust neck of the cartridge, and the other end of the nozzle is forced into a steel-ring flange arrangement which is welded to the combustion tube (see diagram). This tube is flared at the front end and open so that atmospheric air can flow around the cartridge and into the flare when the engine is in motion. This is essentially the same as Sgt. Henwood's setup, except that here, the fuel tank is mounted in front of the combustion tube and it is pressurized by heating. The CO_2 cartridge is designed to take considerably higher pressures than are generated in this engine so that there is no danger of an explosion.

Two wire clips hold a scoop, or tray, beneath the fuel tank in which some fuel is burned to generate pressure within the tank, which forces the fuel out through the tiny fuel orifice in the metering nozzle. The diameter of this opening is .010". A fine wire mesh is placed in the metering jet to keep dirt out of the tiny fuel orifice, and fibre glass thread is packed into the fuel tank to guarantee an even flow of fuel. Once fuel begins to spray out of the jet and is ignited, the engine is put in motion and starts to develop thrust. A rotating arm, consisting of a bent wire clothes hanger swiveling on a beaded light chain, was used in the author's tests of the jet, which revolved at approximately 15 mph.

The unit should probably also be classified as a rocket or, to be more exact, a rocket-ram jet engine. It appears to obtain some of its thrust from the fuel escaping through the nozzle under pressure.

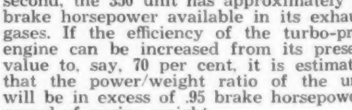
Model Turbo-rocket. A unique application of a rocket-turbine-propeller combination has been run successfully in England by P. R. Payne. The unit consists of a *Jetex 350* rocket exhausting into a small turbine wheel which is geared to a propeller shaft. According to the American distributors of *Jetex*, plans are under way to manufacture the engine in the near future.

In the original experiments, a four-bladed 7-inch propeller was used. By modifying the *350*, it was made to deliver approximately 5 oz. of thrust for about 8 secs. With two charges, thrust was made to last in excess of 17 secs. In combination with the turbine wheel and propeller, the net static thrust of the power plant averaged 10.5 oz., or more than double the thrust obtainable from the rocket without the turbine. This is due to the fact that the propulsion efficiency of a spinning propeller is greater at low flight speeds (as are usual with models) than the propulsion efficiency of a high velocity jet. When developing this thrust, the propeller was spinning at approximately 6,000 rpm.

In designing such a unit, consideration should be given to the over-all efficiency of the rocket-turbine propeller combination, or the total efficiency. In calculating this, we must consider the efficiency of each component and determine each loss separately. This will include the efficiency of the turbine (the amount of energy available in the rocket exhaust at the turbine inlet that can be converted into rotational energy), the efficiency of the gears and bearings (losses due to friction), and the propeller efficiency.

The kinetic energy of the exhaust gases of the *Jetex 350* unit is 71.5 foot pounds per second. Since one horsepower is equivalent to the expending of 550 foot pounds per second, the 350 unit has approximately .13 brake horsepower available in its exhaust gases. If the efficiency of the turbo-prop engine can be increased from its present value to, say, 70 per cent, it is estimated that the power/weight ratio of the unit will be in excess of .95 brake horsepower/pound of engine weight.

Quoting from a description of one of the test runs published in the English Aero-



Graph showing thrust vs. time on a typical run of *Jetex 100*

MODELLER: Test No. 2—"For this test the 7-inch four-bladed propeller was used and great care was taken to see that it was firmly locked. The unit was mounted in a static thrust rig. Five seconds after starting, the propeller started to slow down and the turbine accelerated to a very high speed emitting a piercing scream. Top speed was about 2,000 mph. It was later found that the soldered joint between the shaft and the face plate had failed and that the friction of the worm gear had forced the mating gear forward towards the propeller. This in turn wrecked the rear thrust bearing and the whole shaft moved forward about 1/4". The turbine bearings appeared in good order."

The results of more recent experiments are not available, but it is assumed that greater degrees of success were obtained since, as noted, the company expects to manufacture a rocket-turbine soon for popular use. If you wish to experiment with your own jet-turbine design, you may be able to obtain an efficient little turbine wheel by disassembling a surplus aircraft instrument, one which is air driven. Many of the gyro-instruments were driven by compressed air blowing into a turbine wheel.

The field of model jet propulsion is like its full-scale counterpart, still in its infancy. From the data presented, it can be seen that the amazing advances in the development of large scale jet power plants have been paced to some degree by the development of similar engines in the model field. Much work remains to be done to further advance our knowledge of model jets. The field is wide open for experimentation and development work by the ambitious modeler and inventor. And it may not be long before models powered by jets will be extending the U-control speed records beyond the 200 mph mark. From there on, the sky's the *limit*. Don't rule out the possibility of supersonic model flight in this generation. The Army claims that its research scientists will soon be testing its scale research models at supersonic speeds in free flight. It is the author's guess that rockets or ram jets will be employed to crash the so-called sonic barrier.

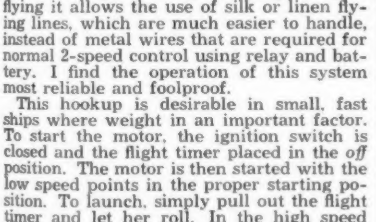
2-SPEED CONTROL

by R. A. Chesher

THIS drawing shows a two-speed timer arrangement which I am using and which I think will be of interest to all readers of M.A.N.

I do not claim this system to be original; it is a modification of existing controls, and is ideal for sport and speed flying. In sport flying it allows the use of silk or linen flying lines, which are much easier to handle, instead of metal wires that are required for normal 2-speed control using relay and battery. I find the operation of this system most reliable and foolproof.

This hookup is desirable in small, fast ships where weight in an important factor. To start the motor, the ignition switch is closed and the flight timer placed in the *off* position. The motor is then started with the low speed points in the proper starting position. To launch, simply pull out the flight timer and let her roll. In the high speed setting both sets of points work, but since the piston is on the downward stroke past center, the operation of the low speed points does not affect the running of the motor. Then, when the flight timer opens the motor slows down but does not stop, and you have enough power left so the model won't drop like a stone.



Design Forum

(*Continued from page* 25)

stroyed. In effect the wing becomes a parachute. Under these conditions, wing efficiency due to carefully selected airfoil sections with particular form has no significance whatever.

Under rules which allow this type of plane, contestants are concerned chiefly with *structural* and not *aerodynamic considerations*, because with any given engine the chief idea is to reduce structural weight. This has more influence on climb than any other factor. The basic factors in the formula for rate of climb are power P, weight W, lift L, and drag D, as follows: Rate of climb,

$$RC = K\left(\frac{P\sin\theta + L\cos\theta}{W + D\sin\theta}\right)$$

θ = the angle of climb. So for any given angle, the rate of climb RC is proportional to $\left(\frac{P+L}{W+D}\right)$ When power is large compared to weight, the climb is steep and fast, and lift and drag are therefore relatively small, Fig. 1. However, when the P/W ratio is fixed and small, then the angle of climb is small, Fig. 2, and lift L and drag D become relatively more influential. In the latter case, high wing lift increases the climb greatly and low drag allows more available power with resulting greater lift and climbing speed. Consequently, climb with a low fixed P/W ratio depends on the values of *lift* L, and *drag;* or in other words, knowledge of aerodynamics and design. This is why rules that specify low power and greater weight, such as 150 oz. per cu. in., piston displacement, stimulate greater thought and understanding when considering duration problems.

More recently, and belatedly, it has slowly seeped through the consciousness of our rule makers that fewer airplanes would be lost, and contests would be a measure of greater aerodynamic knowledge if the power-weight ratio factors were penalized and lift and drag factors were made more important. So, now an airplane must have a certain weight for a given amount of power, 100 oz. for every cubic inch of piston displacement, to be exact (but which is not enough to give desired results).

Ignoring the plea to establish rules that would prevent loss of planes in thermals, the rule makers eliminated wing loading restrictions and said, "To compensate for lowering the power relative to weight, we will let you build your contest models with as much wing area as your ingenuity can produce. Models of this type are reduced in rate of climb but wing area is increased to such an extent that the lift relative to the weight is very large and the drag of the whole airplane is reduced compared to the lift because these planes fly more slowly. This slower flight reduces structural drag and increases the lift-drag ratio of the whole plane. This in turn flattens the glide and reduces the sinking velocity. Not only is the sinking velocity reduced by a more gentle glide, but the lift coefficient is increased compared to the weight of the airplane. These are the two factors which influence sinking velocity. More simply, the sinking velocity is inversely proportional to the square root of the lift coefficient; $Vs = K\sqrt{\frac{1}{C_L}}$. So under the rules, where the climb is reduced by lowering the power relative to weight, you now can increase gliding duration by increasing the lift with larger wings. It is important to remember that duration is largely dependent upon sinking velocity, not necessarily the angle of glide. The drag can be high and the glide steep yet the duration can be long and sinking velocity low, because the lift is extremely large. It is the lift which determines the rate of descent with any given weight. However, you might say that the duration depends upon the power relative to the weight, not the lift relative to the drag, *under the present rules.*

The rule makers can make contests a more exact measure of aeronautic knowledge and ability instead of merely a matter of chance or the result of some capricious thermal, if they really want to do so. They must emphasize the importance of the flight factors—drag, and lift relative to power. This can be done by lowering the relative importance of power and weight, as follows. First, increase the power loading. That is, increase the allowable weight of the airplane relative to the power used. Instead of 100 oz. per cu. in. of piston displacement, make the loading 150 oz. per cu. in. Second, establish a wing loading requirement of 8 or 10 oz. per sq. ft. of wing area. What do we have now? We have an airplane of a certain weight with a given wing area for every ounce of weight and only a limited amount of power to fly this weight with this amount of wing. This means that your problem is efficient design. You must create an airplane with a form that gives the greatest amount of lift for a given amount of weight in order to obtain a low sinking velocity, and an airplane *with the least amount of drag relative to the engine power in order to obtain a maximum rate of climb.* It is obvious in the latter case that with a fixed weight relative to engine power and wing area, the only variables are the drag and the lift obtainable from the given amount of wing area. In other words, efficiency of aerodynamic design becomes the measure of performance. The contestant who can obtain the greatest amount of lift from his wing with the least amount of drag (wing and structural), will excel in contests, *provided that he is a master of the one other vital factor that enters the problem; that is stability.*

This factor depends upon the form of the airplane; how required surfaces and weights are put together and arranged. Contests, therefore, become a measure of proficiency in the art of aerodynamic efficiency and stability. This is the primary problem of the full scale airplane designer, and rules which encourage the design of model planes on this basis prepare our young men for the problems they are going to meet in designing full scale aircraft. The rules, as they were and are now, do not do this. They merely cater, in plain words, to the play boys who prefer thrills to greater knowledge. They also have the disastrous effect of enabling planes of mediocre design to win contests, so that contests are not a true measure of the contestants ability. Thousands of model fliers who know very little about designing models, or the real science of flying them, are enticed into the game by the thrills of flying models and winning contests irrespective of merit. By this we do not mean to say that expert model builders do not win contests—because they do; but with the present rules, there can be less difference in the performance put on by experts and novices.

With planes designed under rules requiring greater weight for power and wing loading limits, the time of engine run could be increased because the rate of climb would be less. Fig. 3 shows the type of climb of the present day model with resulting glide. Glide path A represents a model without dethermalizers; B with dethermalizers. You will note that path B is steeper but the rate of descent is about the same so that loss of altitude in a given time is no more than in the case of A.

Fig. 4 represents the typical performance of a model with greater power loading and with wing loading limits. The climb is not so steep. Therefore, instead of 20 secs., 40 or 50 secs. can be allowed in order to have the model obtain the same altitude as in Fig. 3. This longer motor run allows greater time for the *demonstration* of climbing efficiency and therefore is a more accurate measure of the model's efficiency in climb. The glide will be faster and sinking velocity more than in Fig. 3, because with wing loading limits, the wing loading in the majority of cases will be greater. The angle of this path and again the rate of descent will be determined on the merits of gliding efficiency; that is, how much lift can be produced from a given amount of area relative to the weight of the airplane. This does not prevent the use of dethermalizers. The problem here is to create a wing with great climbing efficiency, high lift and low drag, and with low sinking velocity characteristics; namely, high maximum life coefficient. Instead of a mere structural problem, it becomes one of designing an *efficient wing* and *airplane form* for a *specific purpose.*

Many present-day model fliers think of model plane flying as a comparatively modern sport. Actually it is much older than flight with full scale man-carrying airplanes. Models were flown long before man left the ground with wings. They were, in fact, the means in earlier days of obtaining data for full scale flight. Model flying first took hold as a scientific and experimental hobby in about 1907. 1908 saw regular contests in New York City and other parts of the world. One of the old contestants, who was then residing in Germany,

was Martin Sultan, now a dental surgeon at 70 Allenby Road, Tel Aviv, Palestine. We have received a very long but most interesting letter from him, which was inspired by comments in "*Design Forum*" regarding canard or tail first airplanes. Dr. Sultan began his flying career with models in 1908 and has followed this hobby during the years until the present time. Fig. 5 shows an interesting photograph, taken in 1922, of Dr. Sultan (left) with one of his large 3-propeller canard pushers. He says, "In my opinion the canard is the most successful and interesting plane for beginners as well as experts. A correctly designed and built canard model will never stall or dive and crash. I have never lost a canard model by a crash and I have never broken a propeller or wing in spite of the fact that wing and elevators have always been fixed to the fuselage." Dr. Sultan now is building a radio controlled canard model of 3-meter wing span (9'10.1") powered with an *O.K. Twin* engine. You see, after all these years, he still pursues his hobby.

One of the greatest problems in gas model canard design is locating the engine more conveniently and at the same time having the resulting C. G. forward of the main wing, without weighting the nose. If the engine is placed in the most convenient location at the rear, behind the main wing, usually the center of gravity is so far back that the front wing will necessarily be very small if the plane is not to be tail heavy. Dr. Sultan suggests sweeping back the wings in order to bring the center of lift farther to the rear, relative to the center of gravity.

Mr. J. M. Fullarton, of Summer Hill Road, Glen Iris, Victoria, Australia, also makes this suggestion and sends us a photograph, Fig. 6, which shows one of his canards with the engine at the rear and wing swept back. He says, however, that even with this arrangement the model is still tail heavy and the nose had to be weighted to obtain proper balance by bringing the center of gravity forward of the main wing. "The swept back wing of this model had a tendency to stall at the tips, apparently causing the whole model to stall." He therefore attached the white tabs, shown at the wing tips, to act as flaps. He indicates that these reduced the wing tip stall. Examination of his model, however, suggests another more vital reason for the stall of his airplane. Apparently, the rear wing stalled *before* the front wing. We are of the opinion that this stall did not result necessarily from the swept back feature of the wing but instead from the fact that the rear wing was dihedraled and the front wing straight. A dihedraled wing will stall sooner than a straight wing; and from many years of experience with these models, it has been found essential to give the front wing considerably more dihedral than the rear. With large front dihedral, as the airplane approaches the stalling point, the front wing spills the air from its tips, losing lift rapidly compared to the rear wing lift. Consequently, the nose of the plane drops and normal flight position is assumed.

If readers are in doubt concerning these results, we suggest that they construct a simple canard glider, using a straight front wing and a well-dihedraled rear wing. Try gliding this plane and note the results. When it slows down or noses up slightly, the rear of the plane will sink and the whole plane tail slide, simply because the rear wing loses lift before the front wing, due specifically to the lack of dihedral on the front wing. Another bad performance feature of canards with straight front wings is that when in a bank, the nose will slide sideways and drop without lateral recovery so that the plane is nosed toward the ground and dives. With large dihedral on the front wing, the plane rolls *laterally* back into level position as soon as the nose starts to slide sideways.

Some other interesting questions which have come to us will be discussed in the next issue. We appreciate the contributions of readers whether or not we have been able to answer their comments. Send your contributions and questions to "*Design Forum*," MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York 17, N. Y.

Parlor Pursuit

(*Continued from page 15*)

on a hollow shaft or brass tubing 1/4" in outside diameter. The hollow shaft enters a tight-fitting hole in a wood extension block 1" x 1" x 2-3/4" fastened across the top of the plywood upright on the side remote from the motor. This block may be clearly seen in the photograph of the pylon. The tubing should be long enough to project an inch above the pulley.

Several metal washers are placed on top of the large pulley. The other volume control bushing serves to pivot the strip of plywood 1" wide by 4" long, which has a slot 3/8" wide cut back 1-3/4" from one end, as shown on the plans. This strip of plywood is the part of the pylon which supports the wire guides that keep the cords feeding straight at the driving pulley, even though the flight altitude of the model varies.

Attached to the plywood strip also is the metal bracket used to house the inner end of the sato-bar during take-off. Aluminum cut to the shape shown is bent to form a bracket with a socket at the lower end fitting closely but not tight on the end of the sato-bar. The metal strip, which we can call the sato-bar bracket, is curved to clear the motor and other fixtures on the pylon as it rotates. It supports the sato-bar about 5" below the lines.

The design of the sato-bar will be found on the drawing. The length will depend on your flying space. If your bar is long you might have to start with ¼" square at the inner end and taper it to 1/16" square, or even streamline shape, at the outer end. Use the minimum weight which will remain straight under the tension, when taxiing.

The pin in the sato-bar is inserted in a hole drilled in the model about 1/2" behind the point of entry of the flying lines. With the model on the ground, place the sato-bar in the pylon socket, and insert the pin in the hole. Form the belt of No. 25 linen thread and tie it so that it is just snug on the pulleys. Now raise the model while holding it just far enough from the pylon to keep the belt tight. You will find that since the lower end of the sato-bar bracket is so far below the lines, the sato-bar does not reach the model when it rises, and thus the bar drops free as soon as the model takes off and climbs. Centrifugal force on the sato-bar clears it from the pylon first; it then drops from the model. As the bar enters the model behind the C.G., when it drops, the model becomes slightly more nose-heavy, which reduces the angle-of-attack and compensates for the loss of weight of the sato-bar.

The pilot's office of the layout consists of two controls; stick and throttle. The stick is a length of 1/2" dowel, 7" long and pivoted at its lower end between two pieces of plywood set in grooves 1/2" apart at the front of a length of 1" x 8" board. A cord fastened to the stick about 1-1/2" above the pivot, crosses the floor alongside the power cord (and under a metal rollover shown in the photograph) and attaches to the control bellcrank of the pylon.

The throttle is a rheostat suited to the motor used. We are using a motor from a Gilbert fan of about 8" blade diameter. The throttle is a wire-wound rheostat of 1,000 ohms, 10-watt rating. About one-third travel of the arm stops the motor. This is convenient, as we have fitted the rheostat through a piece of plywood set in a groove of our pilot's office baseboard, about 6" behind the stick, and to the left of it. Instead of using a knob, we drilled the end of a 5" length of dowel and fitted it as a lever on the shaft of the control. This is the throttle.

Another motor we used successfully was obtained from a fan in a car heater. The motor was run from our train transformer on 12 volts, and the transformer provided the throttle lever, ready-made.

To return to the pylon; the hollow shaft of the pulley and the sato-bar bracket permit a length of 1/16" piano wire to be raised and lowered by a bellcrank cut as shown. The bellcrank is controlled by the cord from the joystick attached to its lower end, and returns by the action of the steel wire spring shown in the photographs and the diagrams.

The top of the 1/16" piano wire rod protrudes through the brass tubing where a small washer is soldered. This engages the shorter arm of the control crank, which pivots on a wire hinge fastened by 4-40 bolts to the rear end of the plywood strip used to pivot the sato-bar bracket. Bend the hinge until the 1/16" piano wire rod operates freely inside the tubing. The linen thread from the bridle cord of the model enter the center guide and then fastens to the hole in the vertical arm of the control crank. We form a loop about 1" long in the cord, pass the end of the loop through the hole in the horn, open the loop and turn it back over the top of the control horn. Thus it is simple to slip other models on at will.

For the first few flights use models weighted to trim near the leading edge of the wing. Fit a stop on the elevators to prevent them having any droop. Set up the "homedrome" and complete the following pre-flight check:

1) Sato-bar engaged at both ends.
2) Driving belt from aircraft to pylon on both pulleys and free from frays, loose ends, or cross-overs with the control cord.
3) Control cord on the control crank and through the correct guide.
4) Motor driving belt in the grooves and free from frayed ends. (We had a frayed end foul up once and the following take-off was colossal!)
5) Rollover in place over power cord and control string.
6) Flippers moving with the stick.
7) Throttle closed. Switch on, crack the throttle until prop makes one slow revolution.
8) Stick back, no obstructions in flight circle. Keep the chandelier well up! Smoothly and fully open up to full throttle.
9) O.K., so she backed up! That'll teach you to put the belt on the pylon the right way round!

Gyroscopic action on the propeller has an enormous effect on the trim of the model. Propellers rotating toward the outside of the circle tend to raise the nose of the model, and vice versa. These tiny props turn about 6,000 rpm. Generally, if you have trouble with the belt slipping, use a smaller prop. We have had a model fly with the return line from the pylon to the aircraft so loose as to drag on the ground during flight. Acceleration from this speed to full flight was, however, difficult and had to be made quite gently.

Our models have included the ones shown in the photograph all of which perform well, and several others not still surviving. A commercial pilot friend of ours, two amateur pilot friends, and some other model hounds have all flown the system at times, and we usually have to leave them out of the "cockpit" before they crack up all our fleet. We get speeds from 10 to 30 mph; 30 mph. on 39" lines gets tiring to watch very quickly. We can almost get airsick trying to fly a racer, or that 6" *Hellcat* in the picture.

Well, enough of this. Let's get back to that sofa and figure out an automatic pilot so we can just get dizzy watching it fly lazy circles around the lampshade. This personal handling is too tiring!

PHOTO CREDITS

Page		
17	All	Marvin V. Irwin
21	All	Official Fiat Photos
24	Top	American Telasco Ltd.
55	Lower	Fouga and Company

Air Ways

(*Continued from page 29*)

changes, however. The major addition was a fixed landing gear. Although when the photograph was taken, the airplane had only been used for exhibition, and an electric motor has been installed to spin the propeller, he expects to equip the model with a *Bantam 19* for flight tests.

The speed job in photograph 6 appears to be of a design very familiar to American builders though it is the work of Giuseppe Gottarelli (Viale Risorgimento 7, Bologna, Italy). He writes that this 16" span ship has clocked at 115 mph when powered by a compression ignition *Super Tigre* engine of .37 cu. in. displacement. This engine, which is especially built for racing purposes, has a crankshaft rotary valve, two ball bearings, and an aluminum piston with two rings. Just before the 115 mph flight, the engine was found to be turning up 15,000 rpm on the ground, with a 7-10" propeller. Mr. Gottarelli is now flying a *McCoy 60* engine in his model, but we haven't heard of the speeds he has reached.

The glider enthusiasts are represented this month by H. Bartels (Ap. Aereo 3470, Bogota, Colombia) whose *Gull* is shown in No. 7. Another model of this same design won first prize in a Toronto, Canada, meet for its builder Frank Anderson. The wingspan of the *Gull* is 122 cm. and length is 75 cm.

A really accurate scale model may be seen in photo 8. This is the DeHavilland DH-82 *Tiger Moth*. The model is exactly one-tenth the size of the big plane. At the time the picture was taken by M. J. Gordijn (Paradijslaan 133², Rotterdam, Holland) only a few hand-launched glides had been attempted. These tests showed that greater dihedral than true scale would be required. The power will be furnished by an *E. D. Bee* diesel which has a displacement of .061 cu. in. Mr. Gordijn builds models of all types, among which he has produced a record-holding canard glider. He is 27 years old and would like to contact an American pen friend or club interested in experimental designs in all modeling categories. He is of the opinion that European towline gliders are considerably better than similar American designs, but is quite willing to debate the matter with U. S. fliers. Who will take him up on this?

The attractive little pursuit ship in our ninth snapshot will be remembered by old-timers as a *Boeing P-26A*. The ship was built by Dick Uppstrom (870 Duncan Avenue, Washington, Pennsylvania) following the conventional hollow block method, and is powered by a rotary valve, glow plugged *Ohlsson 23*. The ship is painted in the colorful style of its design period, and all insignias and decorations were applied with a brush and masking tape. The body and wheel pants are blue; wings, headrest, and tail surfaces are yellow; the trim is white and red. A scale of 1" = 1' was used and the model came out to just a 26" span. Although it is a bit heavy for the 23 engine, it will be entered only in scale events.

Photo No. 10 illustrates a very successful Class A free flight gassie, designed and built by Richard Hill (Ten Renner Place, North Arlington, New Jersey). The design is very simple but strong and light, and the model does not require very much power to reach considerable altitude. An ancient *Ohlsson 19* was found to provide ample thrust, and the *Hitch Hiker* has had several out-of-sight flights.

Dr. J. N. Simmons (4702 Whittier Boulevard, Los Angeles 22, California) who goes in for beautiful sport types is responsible for the very nice shoulder wing model which is shown in No. 11. This plane is all-balsa construction and is rubber-powered. However, it was used as a basis for successful controline models. It has a 24" span and has been found to be very sturdy and a consistent flier, in addition to being built easily and quickly.

The last picture this month is an experimental radio control model designed and built by the old *Rudevator* enthusiast Dick Schumacher (6741 Darby Avenue, Reseda, California). This low wing ship has a 5' wing with a ten-inch chord; it weighs 3 lbs. 2 oz. and powered by a glow plugged *Ohlsson 23*. After the photograph had been taken, slots were added to the wing. Dick notes that the plane glides nicely, but is a little troublesome as under power, the C. G. came out in the wrong spot. He feels that he has this problem licked now, however, and states that the ship is very fine from a servicing standpoint and that it is certainly different from the general run of models.

Note: We receive continual inquiries asking if ships which are pictured in our "*Air Ways*" column are packaged in kit form and if plans are available. In almost every case, the ships shown are original designs and thus not kitted. Information concerning the models can be obtained from the builders, whose addresses are given.

* * *

NEWS OF MODELERS

PEN-PAL SEEKERS: E. Shillito, 63 Langdale Drive, Wakefield, Yorks, England, is the secretary of the *Wakefield Model Flying Club* and would like to correspond with an American club . . . Witold Stanczyk, Grodzka 42, Krakow, Poland, is eager to contact a fellow modeler . . . W. Tootell, 51 Stump Lane, Churley, Lancs, England is 18 and has been flying models for a couple of years . . . A. E. Dowdeswell, Churchill Villa, Barnwood Main Road, Gloucester, England, is in his twenties and wishes to write to a modeler whose interests are general.

EXCHANGE MOTORS: R. L. Cook, 17 Hutcheon Street, Aberdeen, Scotland . . . Dennis V. Niscon, 11 Station Road, Elmesthorpe, Earl Shilton, Leicester, England, is seeking an *Arden .199* . . . Brian Bottrill, 179 Humberstone Drive, Leicester, England.

EXCHANGE MAGAZINE, PLANS, ETC.: G. T. C. Perkins, The White House, 19 West Street, Epsom, Surrey, England.

SPECIAL REQUESTS: P. Cartagena, 19 West 111th Street, Apt. 1W, New York 26, New York, wants to trade magazines and anything else with a modeler who lives in Puerto Rico . . . John W. Stafford, 5A Gold-

smith Street, Mansfield, Notts, England, found a pen friend, Frank Wade, through our column about a year ago, but lost his address and now would like to resume writing to his old pen-pal . . . Richard Boyd, 404 West Elm Street, Urbana, Illinois, is looking for 3/4" scale model plans of the ship *Mr. Mulligan.*

CLUB NEWS

California

The *Orange County Thunderbugs'* first All Stunt Contest, held November 27, 1949, was a great success! The most hotly contested section was the Jr. Novice event for modelers just beginning to fly—14-year-olds and younger; in this event they had the largest number of entries. The flight pattern was greatly simplified, with only such maneuvers as dive, climb, wing over, and one loop as part of the pattern. This meet increased the confidence of the youngsters, and because the prize list was long, gave a large number of them the opportunity to take some hardware home to show their proud parents. Final results: *Team Stunt*—John Slater and M. J. Becker; *Women's Event*—Dorothy Malacarne; *Father and Son Team Award*—Bill Alford and Denis Alford; *Appearance Award*—Ced Galloway; *Jr. Novice*—1. Denis Alford; 2. Ralph White; 3. Don Wicks; 4. Jerry Miller; 5. Al Sherwood; 6. Johnny Armour; 7. Johnny Armour; 8. John Sinclair.

The *Mustangs*, formerly a controline club, sent the list of winners of their first Free Flight Contest—which was a big success. Edna Kroll, Dorothy, Josephine and Gloria Bazurto took care of the most welcomed event at the contest—the refreshment stand. Winners: *Class A-B Sr.*—James Stark; *Jr.*—D. Czeikowitz; *Class C-D Sr.*—Sam Kadlecik; *Jr.*—Laddy Loyd; *Infant Class*—Lee Brillhart.

Connecticut

The Seaside Sanatorium, in New London, is a hospital for young boys (age—two to twenty-one) who have T. B. of the bone. Since many of the fellows are model enthusiasts and must rely on crutches as a means to get around, slow U-control and stunt ships are the most suitable type of model flying for them. These youngsters are seriously interested in model aviation; but until the *Prop Busters* began spending every Sunday at the Sanatorium, trying to help the boys get a good start, they were all at a loss. Now, as a result of this club activity they have already started their own club at the sanatorium, and are doing fine! The *Prop Busters* are preparing for an air show to be held at the hospital this spring. Members willing to participate should drop a post card to John Affeldt, 74 Raymond Street, New London.

Illinois

At a recent meeting of the *Gas Model Aeronauts*, of Chicago, the officers for 1950 were elected. Jules Carrett will be president, Mervin Frazee, treasurer, and Peter J. Sotich, secretary. The *G. M. A.* meets regularly every second and fourth Friday of each month at the Gage Park Fieldhouse. Further details may be obtained by contacting the secretary at 3851 West 62nd Place, Chicago 22.

Indiana

The *Indiana Association of Model Airplane* Clubs is about to begin its third year; the newly elected officers—Homer Brown, president, Harold Stoffer, vice president, Glenna Williamson, secretary, William J. Campbell, treasurer, and Ed Lidgard, contest director—promise to do their best to make 1950 a good year.

Ohio

We have not received the results of the December, 1949, Cleveland Indoor Model Airplane Contest, sponsored by the Cleveland Women's Chapter and the Cleveland Press, in time to include in this issue. However, we hear that Mrs. John W. Hillegas and Mrs. Harry D. McCall, co-chairmen of the Chapter's Junior Activities Committee, were in charge of arrangements for the model meet.

The Public Recreation Commission announces the formation of a series of PAL clubs (Plymouth Aero League clubs) throughout Cincinnati in their community centers. The Plymouth dealers, of Greater Cincinnati, are donating material and supplies to the PRC for conducting these model airplane building classes and clubs. The commission's Community Center staff will serve as instructors. Clubs have been initiated at the following locations: Airport Playhouse, Grant Center, Lytle-Bethel, Carthage Center, Washington Playground, Winton Terace, and Lincoln Center.

Elections of officers for 1950 are still being sent to us; we hear now from the *Rubber City Aeronauts* of Akron. Bob Baughman and Ray Yoho were elected president and vice president respectively, Barbara Yoho will be secretary, Ed Conrad, treasurer, and Bob Housley, contest director.

South Africa

Editor L. Sidney, of FLYPAPER, commented in the latest issue: "I wish to make it quite clear to our readers that this newsletter is not run by the S. A. M. A. A., B. M. A. A., or any other association or club. We have a free hand and can express ourselves as we wish. This is your magazine and we are willing to help you if we are able to." Send all correspondence to the Editor, L. Sidney at 12 Allenby Road, East London or T. Engler, 17 Schultz Road, East London, South Africa.

The Circulator

(*Continued from page* 17)

wing pattern from plans and cut the aluminum slightly oversize. Mark a line for the leading edge and begin to bend wing over a sharp straight edge. Bend until the angle of 30° is formed then proceed to work by hand slowly. You can obtain the desired airfoil if you work slowly. Now mark the rivet locations and drill through the upper surface of the wing only, with a 1/16" drill to take 1/16" O.D. Rivets. After both wings are to this stage, place them on a board—see wing jig detail on plans. Now continue to drill on through the lower surface; this process is necessary to keep the wings straight. Countersink the holes on both top and bottom with the point of a 1/4" drill. Begin riveting by placing rivet in hole and cutting off as closely as possible with a pair of diagonals. Squeeze trailing edge firmly and tap rivet with a small hammer, using a small piece of iron as a bucking-bar. The piece of metal used for the wing tip is 1/8" thick S.O. aluminum; tips may be made of wood, if you desire.

Each wing is held to the spar by two small 1/4" wood screws, one on top and the other on the bottom. An ordinary straight pin is pushed through the fuselage from the inside to key the trailing edge of the wing, while the leading edge is keyed by a shaped block.

The bellcrank is made of .040" 24ST aluminum, while the push rod is of .032 piano wire. Be sure not to make sharp bends in the push rod, or it will crystallize and break during flight. The fuel tank is built up of .005" tin or shim stock—the plans give full size pattern and location of filler, vent and pick-up tubes. A 1-3/4" needle nose spinner is cut down to 1-3/8" diameter for this ship. The cowl is held on by a bracket bolted to the engine.

Good luck and success in all the meets you enter in 1950—I hope to see you winning contests and setting records with your own *Circulator*.

What About Professionalism?

(*Continued from page* 13)

sional, which due to space limitations we have been forced to abridge:

"For as long as I can remember we have called this business of building model aircraft a 'hobby' and I guess it has been one for a good many people. However, it would seem that the passing of time and the great increase in the number and magnitude of model contests sheds a different light upon the subject.

"A hobby, as it is generally known, is something at which you can work during your spare moments, usually to obtain some relaxation from your daily chores. It was never intended to reach very far outside of your own home or community, or was it ever intended to become a highly competitive routine. However, to a great many people in the country today model airplanes have become far more than this.

"Every year the AMA announces that they have had a vast increase in the number of contests held as well as a decided increase in their respective sizes and attendance. When model airplane flying becomes as competitive as this, with modelers covering practically the whole country in order to compete with each other, it can hardly be called a hobby; in fact, it has become a full-fledged 'sport.' I cannot say for sure, but I believe the "model sport" must now rank quite closely in number of participants with many of the other non-professional sports such as bowling or speedboat racing. It would therefore hold true that each section of the country is going to develop its own 'experts' who become better (as a rule) than the average modeler in his own neck of the woods.

"There must be a reason why these fellows become experts and others just never seem to get much farther ahead. Every expert that I have ever had the pleasure of meeting has followed the same pattern to obtain his success and it is an old story too, that holds true in any other sport where competition is involved. Work is a harsh word, but actually it is the one thing that will bring success no matter what you care to accomplish. With model building, to become an expert you must be almost a fanatic, to put in the hours required to learn the ropes and keep on top.

"What this all amounts to is that you are going to have *experts* no matter what is done. It just cannot be helped.

"If a model builder becomes good enough to enter the industry and becomes a success, he must be really good in competition and know what he is doing. If he stays out of the industry, he is going to continue to be tough to beat and go on taking the bacon home whenever he feels like it. If he enters the industry, he will be bringing to all the modelers the results of his experience which will tend to upgrade the materials offered for sale. At the same time, he couldn't possibly get any better as time goes by than he would if he stayed at his old job.

"On the other hand, if the experts stay out of the industry, it is going to revert to businessmen who have only the modeler's dollar at heart. If they desire to promote their products, they will have to back a few modelers to the hilt by underhanded methods, which certainly is not fair competition. There have been a few cases in the engine industry whereby certain modelers were supplied with new or better power plants that were not available to anyone else. This was not fair competition and never will be; yet is an example of what can happen when experts are completely out of the picture.

"All in all, a modeler is a modeler at heart, and I have yet to see one that would not tell you his most prized secret if asked about it in the proper manner. They are proud of what they have accomplished and want everyone else to share their good fortune. When they enter the industry, you can be assured, if they are true modelers at heart, their reason for doing so is to be able to pass on their accomplishments to other modelers so that they, too, may get more enjoyment out of the sport. It is a

grand feeling to walk onto a contest field and see a majority of the contestants using something that was developed by you for their benefit!

"And it is a grander feeling to be beaten by someone using the very item that you provided them with. Take it from one who has had it happen."

Art Hasselbach is an old friend of ours, whom we've watched appear many times in the winners' circle. He says:

"I personally believe that in the true sense of the word 'professional,' there is no such classification of modeler in competition today. Most of the consistent modelers—those connected with the model industry and those outside of the model industry—put in a considerable number of hours in designing and testing their ships; it is from this category of builders that most of the younger modelers secure their knowledge for the designs of their own ships.

"It is true that there are many who enter these contests on an unfair basis. By that, I mean they enter more than one model and in some cases have as many as five or six 'helpers.' Of course, with this advantage they are able to get in most of their official flights, whereas the average modeler can only complete his official flights in one class.

"If the Contest Directors would strictly enforce the AMA rules, I am sure that there would be no need for any controversy on this subject.

"Of course, occasionally a model industry member is fortunate enough to obtain one of the first few of a new-type engine; if it is a good engine, he does attain good results, but nothing is ever mentioned about the many engines that are tried at his expense where the results are N.G. This information is passed on to the modelers, and it saves them a lot of time and money.

"I know that by having these so-called 'professionals' actually compete in contests, it gives them the opportunity to secure information which is beneficial to the compilation of AMA rules which, I am sure, in the long run gives everyone a better model airplane meet. Let us not ignore all the hard work that most of these fellows put in this hobby by prohibiting them from competing, because it is their hobby as well as that of the new modelers starting in competition."

Ray Acord is known to all by reputation, and he says:

"First, before I discuss this question at all, I will go on record as being against using the word 'professionalism' describing any model builder. I would rather substitute the word 'expert.' This decision was made by the *California Association of Model Builders* about a year ago. By expert, I mean the group of modelers who are naturally expected to be in the first five or ten places in a contest. The only luck these fellows have is when they have bad luck, and don't come through. Because they are expert modelers, they usually know what their bad luck was, and make an effort to see that it doesn't occur again.

"Rather than take a definite side with a simple yes or no, I do believe some sort of a handicap would be desirable for people who consistently win. While it is true that some of these consistent winners are in the industry, it is also a fact that most of them are not. Therefore, if they are to be grouped or handicapped, it only seems right that they should be grouped or handicapped according to their modeling ability, rather than how they make their living.

"Against this side of the picture is the other one, where a professional is said to be simply a person engaged in the hobby business, that is actively engaged in the sale or manufacture of model items. For example I have and have had for years, people working for me in my factory, selling, running machine shop equipment, as well as woodworking equipment, making engines, props, and kits. Some of these people are not even model builders. Some build models once in a while, but have never entered a contest. Should these people be called 'professionals' in a sport where there are no paid competitors, and seldom any cash prizes?

"We had a contest run on this idea once here in California but only once! It was so unsatisfactory that it was never repeated. One group, the professionals, who were those engaged in the hobby industry, flew together. There were contestants in this group that were flying in their first contest. Others of that group, consisted of sincere people in the industry (principally retail shop owners) who make a practice of entering contests—not because they hope to win, but rather just to add their support to the contest, and to pay their entry fee to help out the sponsoring club. Then there were a couple of expert modelers who unluckily fell into this group. They, of course, had no competition—their competition was flying in another group called 'amateurs.' Into the 'amateur group' fell such people as Frank Cummings, Bob Holland, Bob Hanford, Keith Storey, Milt Ronney, and so many more it is useless to try to name them. You yourself, must know of many expert modelers in no way connected with the model industry.

"Last, and possibly the most important argument is that by far the greatest percentage of people engaged in the model industry, who actively support the competitive phase of model flying, started out with the hobby of modeling. They found pleasure and enjoyment in their hobby, and eventually it led to their making a full- or part-time job of it. Now, if any rule is adopted that would in any way impair or spoil their fun in building and flying model airplanes, causing them to drop their hobby, they, of course, would cease to function as a great benefit to the contest effort—financially, as well as donating their time, experience and most important, their enthusiasm. This must not be allowed to occur.

"In brief conclusion, I would be in favor of experimental contests being run under some of the rules and new ideas this discussion will undoubtedly bring out. How-

"Professional Forum" Questionnaire

In the belief that the model builders themselves would like to take part in this forum, we are printing this questionnaire. If you would like to express your opinion, here is your chance. The answers to this questionnaire will form the third part of this series of three articles. We will accurately tabulate the answers given, and should have the facts to settle this controversial issue, once and for all.

1. As a model builder, do you find the professional competition an advantage to you, or does it cause you to make out more poorly in contests?
2. Are you content to participate against the professionals, or would you rather see them in a separate class?
3. Do you feel more friendly towards the professionals who do not compete against you, or who do not accept prizes than to those who do?
4. Would you be for, or against, a ruling prohibiting the professionals from active competition?
5. Do you feel the definition we have set up for a professional is fair?
6. Have you had any particular experience in a contest with a professional? Any brief details?

If you want to take part in this interesting forum, write down the answers to the questionnaire and mail them to:

The Editor, MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York 17, New York.

Your answers are important! *You* are the model builders.

Please give us your name; it will not be published if you request us to withhold it.

Mail answers no later than March 20, 1950!

ever, I am definitely opposed to merely calling someone a professional modeler, just because he is connected with the industry in any way."

Our anonymous friend is an old-timer, an ace modeler, and has been most recently known to us as manufacturer of a diesel motor. For his own reasons, he wishes to remain anonymous, which right we grant him. He writes:

"I feel that there are no professionals other than those who design and build models solely for financial benefits—meaning those who manufacture or those who contribute to magazine publications—and of late even these boys seem to be copying from other copyists. These boys directly earn their living by being 'professionals.' How about Jack Bayha—isn't he a professional for moderating this fight, for financial gain? (*Moderator's Note:* He has never won a prize, not even for writing!)

"Others in the field who earn their livelihood at it and yet build and fly, do not make a living by building and flying alone. They make their living like anyone else, simply by exerting effort, energy and time to earn financial gain. Modeling is only a hobby and relaxation as well as a 'hobby sport'—I like that term. Why penalize us who make a living in the business; remember, we did this many years before we started working at it in another way. Is my work any different than a salesman selling magazines—even M.A.N.—or medical instruments?

"I feel that a fellow who trims automobiles for his livelihood is more of a professional when entering a model plane beauty event, than a salesman entering that same event. For that matter, how about a machinist, tool maker or auto-mechanic with access to tools, shop equipment, etc.,—is it fair to allow him to compete against an office worker, clerk or magazine editor?

"Frankly, I think this whole fuss was started by those who were just plain jealous or envious of others in the business who compete and occasionally win at contests.

"I do believe, however, that fellows in the business should use discretion when entering a contest. In the past, certain individuals have entered local meets in their areas where they outclassed the competition, and yet competed for the prizes—that is what hurts the so-called pro. I say it should be O.K. to compete, but not to accept that prize.

"As manager of a wholesale distributing firm, I now have even less time to build and fly. How about the boys of school age, who are able to build daily, and fly in the afternoons. I was in my prime when I was attending school—even won the '39 and '40 Free Flight events at the Nationals. Nowadays, when I can find the time to build five or six ships a year and get out to fly at an occasional contest, I find it harder to beat the boys. When I do, I get the satisfaction of beating strong competition. I *like* the heat of competition, and I don't ever want to lose that right to compete.

"Remember, we grew with the hobby on our ingenuity. Now that we earn our livelihood in a phase entirely remote from modeling, should we be penalized, barred from contests, condemned as a professional?

"I say no, and believe me it will be a detriment to the game when and if some of the over-zealous, envious crack-pots try to split up the hobby. With living trends as they are and the many threats against the advancement of model flying, let's not take away the right of competition from those who help spark it!"

There we have it, a defense of professional model builders. Of course, the use of the word professional has been denounced, and we apologize for its use, but we know of no other term by which such fliers are referred to by the model builder at large.

Basically the arguments presented so far boil down about like this:

1. Professional competition allows the model builder an opportunity to observe expert fliers in action.
2. Proof-testing of the model industry-produced products means better products for the model building public.
3. The professional model builder has become an expert through hard work, and should be allowed to "cash in" on his work.
4. The professional model builder may, or may not, have any advantage over the died-in-the-wool amateur.
5. Unfair competition on the part of the professionals does exist.
6. The advantages of professional competition outbalance the disadvantages.
7. The professional is within his rights in accordance with AMA rules.

There it is—the defense of professionalism. Next month still another group of the nation's top model building men express opinions. They take the stand that professional competition is a bad thing for the model builder and the industry as well.

All right, who's the wise guy?

Model Portraiture

(Continued from page 32)

You may have to move the camera a little closer to, or farther from, the subject to get an exact measure for the lens' combination and scale setting selected. Then recheck to be sure the subject is still positioned properly in the view finder.

While focusing, the correction for parallax is of course made by swinging the camera down, *and the vertical-horizontal swing is in the normal (vertical) position.* When ready to take the picture, shift the link-supported camera mount up to the "picture taking" position and insert the filler block. If the picture is to be horizontal instead of vertical, swing the mount 90° to the left and up.

To prevent the tripod and camera from tipping while shifting the camera mount, weight it down with an iron rod or piece of pipe resting on pegs extending rearwardly from its dowel legs, and metal rings or any other suitable weights hung on a peg through the 1 x 2 leg. The lower ends of the tripod legs may be fitted with either sharpened metal pins or rubber crutch sockets, to prevent undesirable shifting of the tripod during exposure.

Exposure can now be calculated on your exposure slide rule. The wattage of the main light at the camera is used but *disregard* the second light at 45° from the subject as it merely balances the lighting produced by the main light. Add one-half the wattage of the auxiliary lights as they are used merely for fill-in purposes, and you can disregard their distance, using only the tape-measure reading from the main light to the focusing point one-third in on the subject.

Move the slide of your exposure slide rule so that the distance is opposite the wattage value determined, and read the exposure in seconds on the slide opposite the stop opening you are going to use. The smallest stop (largest f/ or U.S. number) should be used in order to get greatest depth of field. The next larger opening would be used for medium depth of field, and the second from the smallest if the subject has very shallow depth. After taking a few pictures of the same subject with different stops you will soon know how to judge which one to use. The left hand picture (A) at top of page 32 was made at f/45 and the right (B) at f/8. The larger stop produces entirely too shallow a field, as will be obvious from a comparison of the two views. Note particularly how fuzzy the nearest propeller and the tail are in the second picture.

The slide rule is graduated for *Super XX* film and for average subjects, that is, approximately half black and half white or a neutral gray. *Super XX* is the film recommended, as it reproduces tints and shades with truer values than *Verichrome* under incandescent lighting and is faster than *Verichrome*, that is, it requires less exposure for a given amount of light. It is a good policy to use only one kind of film until experience is gained, before using other kinds. If you do use *Verichrome*, use an exposure factor of 2.5 (increase the exposure 2.5 times), as that is its relative speed compared with *Super XX*, when both are used under incandescent lighting.

When the lens is adjusted to 22 times its focal length or less, exposure should be increased in accordance with the E $\times$ F[1] scale in last month's article. The exposure factor scales on the back of the slide rule are used for calculating increase or reduction of exposure based on one or more exposure factors. To cite an example: if the front of the rule calls for an exposure of 4 secs. and the camera is focused at 3-1/2' which calls for an E $\times$ F[1] of 1.3, move the slide until its left index (1.0) is opposite 4 secs. and read 5.2 secs. opposite 1.3.

The exposure factor scales can also be used for calculating exposure for subjects which are predominantly one color in accordance with the chart on the back of the rule. For instance, if the model in the above example is blue, expose .8 $\times$ 5.2 = 4.2 secs.

Having determined the exposure time for the diaphragm opening you are going to

use, set the camera shutter for B (or bulb) and expose for that period of time by pressing the shutter release cable button at the beginning and releasing it at the conclusion of the exposure period. The passage of time can be determined by observing the second hand of an electric clock or a wrist watch, although a satisfactory and less distracting method is by counting. After a little practice, rhythm in the counting method, "*on*-one-thou-sand, *one*-one-thou-sand, *two*-one-thou-sand, *three*," etc., can be acquired so that accuracy within 5 or 10% is possible. This will be found quite satisfactory for time-exposure photographs. To close the shutter at the even seconds, release the cable button at "*one*," "*two*" or "*three*" and so on. For fourth, half or three-fourths seconds, release at "one," "thou" or "sand" respectively.

The T setting of the shutter can be used for time exposures, but requires depression of the shutter lever or button at the beginning of the exposure period and a similar operation at its conclusion. It is easy to forget the second operation and leave the shutter open after taking a picture, spoiling several pictures before you discover that the shutter is open when it should be closed and closed when it should be open. There is also more chance to move the camera while the shutter is open and cause the picture to blur. The B setting is therefore recommended. Some cameras have only a shutter operating lever while others have both this lever and a cable release socket. Use of the cable is best, of course, because it is flexible and movements do not affect the camera.

For greatest efficiency in the taking of model portraits, a definite step-by-step procedure should be followed. A suggested outline of steps is this:

(1) Place subject and camera.
(2) Adjust lights.
(3) Focus subject in view finder (camera vertical and links down).
(4) Measure distance to one-third focus point on subject and move camera toward or away from subject until measured distance is equal to the nearest distance listed on your Lens Chart.
(5) Add supplemental lens if indicated.
(6) Recheck focus in view finder.
(7) Correct for parallax (links up).
(8) Swing camera, *if* horizontal picture to be taken.
(9) Add wattage of main light and one-half wattage of auxiliary lights.
(10) Calculate exposure on Exposure Slide Rule and additional or less exposure if exposure factors are to be used.
(11) Expose film for determined period.
(12) Wind film for next picture.

In order to progressively improve your pictures, keep a record of the various factors involved in the taking of each shot, then compare the records and the pictures after they are printed. A temporary record sheet is shown on page 50, November, 1949, M.A.N., to be filled out at the time of taking the pictures. The information can be transferred to the back of each picture after printing. The record mask shown at lower left of this same illustration will be found handy for this purpose. It is formed of light cardboard in the shape of a pocket to slip over the upper left corner of the print and has labeled openings through which the data is written on the print. Lay the print on a smooth hard surface and use a pen or a soft pencil and light pressure to avoid marring the finish on the front of the print.

When making two or more exposures of the same subject with the same camera setting, as when exposing for slide rule timing, and twice and one-half that time, and/or when different stops are used to compare depth of field, the additional pictures can be distinguished from the first one by placing an inconspicuous object (such as a punching from a paper punch) on the model or its support in various positions and noting this on the temporary record sheet.

An example of a record sheet is illustrated on page 32 of this issue. A study of it will show the paper punching note and will also suggest various comparisons of value for your particular purposes. A few special comments may be helpful. Referring to pictures 1 and 2 on the record sheet,

the exposure for No. 1 is 10 secs. When 10 secs. on the slide of your exposure slide rule is opposite f/45 on the body of the rule, the seconds for f/8 can't be read so align 5 secs. with f/45, read 3/4 secs. (approximately) opposite f/8 and divide by 2 to get an answer of 3/8 secs. To time the shutter for 3/8 secs. adjust to 1/25 second and operate the cable release 9 or 10 times without moving the camera. The E × F' of 1.4 for pictures 1 and 2 is used for bellows extension to 3' on the focusing scale as charted in last month's article.

For picture 3, great depth of field is not required, as was the case for a model plane such as picture No. 1, when the model had a 15" wingspread and was only 21-3/4" from the lens; f/32 was therefore used. No. 5 was an experimental shot to compare with No. 4 and determine which picture came out with the best background. No. 5 won, as it eliminated shadows that showed up in No. 4.

Picture No. 6 was a double exposure to show the engine mount in its two different positions in the same picture. Total exposure was increased to about 1-1/2 times the indicated exposure of 2 secs. and each of the exposures was three-fourths the indicated exposure so that both exposures had equal prominence. If it is desirable to make one exposure more prominent than the other, timing can be changed to 2 secs. down and 1 second back which would give a prominence ratio of 2:1, or 2-1/4 secs. down and 3/4 secs. back for a 3:1 ratio and so on. Whenever possible have a black background for the movable part of the model in both of its positions. This will result in the separate exposures of the movable part coming out with maximum clarity. If you want to take a trick shot of a model, making it "twins" or "triplets," use a black background and take a series of full time exposures with the model in different non-overlapping positions.

After all the foregoing suggestions regarding correct exposure, there is one valuable bit of advice that the would-be photographer should heed; *there is no substitute for experience.* We have been speaking of exposure that is most nearly correct for a subject having average light and dark areas. Actually, what is sufficient for the light areas is not enough for the dark areas if there is a great deal of difference in the light reflected from the two. So, exposure is at most a compromise between enough for the dark portions, without being too much for the light. It is evident, therefore, that only through experience can one attain proficiency. Careful following of the suggestions and accurate use of the mechanical aids described will go a long way in helping the reader to attain such expertness quickly.

The accompanying picture of the record sheet itself rates a few comments. It is an example of "copying" which applies to pictures, as well as handwriting and typed or printed pages. Lighting should be "flat"—that is, two lights at approximate angles of 45° and "balanced." To test balance, hold a pencil against the exact center point of the copy at right angles to it and then adjust the lights until the two shadows of the pencil lie along the same straight line and are of equal intensity. Copying is done most readily by placing the copy on a horizontal surface and pointing the camera straight down. To avoid converging edges and lines as in the picture, cover the copy with a pane of glass and to insure parallel lines aline the axis of the lens at right angles to the exact center of the copy. Ground glass focusing is better for copying, as all these points to watch appear on the glass, and adjustments can be made accordingly.

While this is the last of the series of "Model Portraiture" articles, it is to be hoped that interested readers will save the series as they will find them very useful in connection with the making and using of photographic equipment.

The Gull

(*Continued from page 31*)

ings. The landing gear wire is a U-shaped affair about 2" long with upturned ends of about a half inch. Make from .025" music wire.

Covering: The original model was covered with lightweight red silkspan. Red was chosen because of its excellent visibility, both on the ground and in the air. The nacelle was covered with yellow paper. Be sure to have the grain of the paper running parallel to the main spar. Water spray and let dry. Dope with plasticized dope—that is, mix about three drops of castor oil per ounce of dope. Apply a coat of dope to the rudder. Fuelproof the plane. A little care used while doping to insure that no warping takes place will be well worth the time spent. If warps are present, other than the 7-1/2-degree washout, twist the wing to the new position while the covering is still wet and hold there until the covering pulls tight.

Flying Instructions: Attach the rudder to the wing by running a rubber band through the hole in E, over the wing, and then on to G. The plane should balance about 1/2" behind the main wing spar. Test glide, preferably in a grassy field. If the plane is nose heavy, it may be corrected by: turning the elevators up, adding clay to the end of the rudder, or by removing some of the washout from the wings. This may be done by quickly brushing a coat of thinner on the wing to loosen the paper, and then twisting the wing until the paper sets again. If the plane is tail heavy, the opposite procedure should be used.

Use the rudder to obtain a turn in the glide in preference to using the elevators as ailerons. Offset the thrust line as necessary to obtain a climbing turn opposite to that of the glide. The *Gull* appears to have a large amount of downthrust, but this is mostly an optical illusion. Downthrust is usually measured from a line parallel to the stabilizer chord line which on the *Gull* is the wing tips. The eye, however, tends to measure it from the wing center section which puts the apparent downthrust in error by 7-1/2°. The original gave best results with a left climb and a right glide.

You will find the *Gull* a sturdy, consistent performer. Try this plane and see for yourself the advantages of a flying wing. Happy flying!

Scrap Box

(*Continued from page 9*)

6-1/2 min. on its large tank, the ship vanished into the clouds. Pederson has ten club member witnesses. Following this, we hear that an angry paragraph appeared in one of their national daily papers. According to this front-page story, a full-size twin-engine plane was "attacked" while flying at 2,000' by a C/L model, trailing wires and a handle. The pilot of the air liner had to take evasive action.

Which reminds us that the same thing happened over Long Island recently. Well, anyhow, some kind of a model was seen by an air liner and when the pilot mentioned the experience to the control tower operator that worthy objected that "he hadn't even checked in." But here's a better story yet.

A Beginner walks into a Birmingham (England) model shop and wants to buy a Diesel. He is very careful to find out everything about it, notes particulars on various fuels, approximate settings, learns all about the innards, contra-piston adjustments, needle valve and, by the time he leaves the shop he knows everything that is to be known about that engine. This particular engine has a pulley integral with the spinner and he is told how to use a cord for easy starting on the bench.

Several days later he returns to the shop, brokenhearted. He figured it would be so easy but all his attempts at starting had failed. So they go through the works again. How about fuel? How about settings? Everything had been done properly.

"What size propeller did you use," asks the perplexed proprietor.

Says the modeler, "Oh! do I have to have a propeller on it?"

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*K&B Glo Torp 29	14.95
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*K&B Torp Jr. .035	5.50
*Glo Devil 62	12.50
*Triumph 49	12.95
*Triumph 51	12.95
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*Sportsman Jr. 36	14.95
*Sportsman 29	11.95
*Fox 35	11.95
Arden .099	8.75
Arden .199	9.75
*McCoy "9"	7.95
*McCoy 19	9.95
*McCoy 29	14.95
*McCoy 49	19.95
*McCoy 60	22.50
*McCoy 19 Race Car (with pinion gear)	10.95
*Thimble Drome 099	9.95
*Thimble Drome 15	9.95
*Thimble Drome 199	10.95
*Baby Spitfire 045	5.45
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*Joker (C)	5.45
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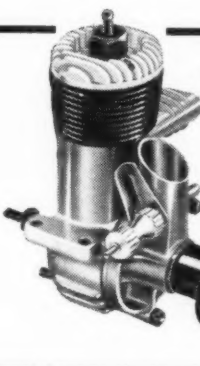

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The Citizen

(*Continued from page* 27)

carrying through from power to glide in what looks like a reasonably good, but not necessarily a perfect, transition.

With the same 15-second timer setting, increase the power by moving the engine timer arm about 1/8" to a more advanced position. This should give sufficient climb to check many things. First, did the plane fly straight, turn slightly, or turn too tight, under power; second, did it show any stalling tendencies under power; third, was the glide fast, slow, straight or banked? These conditions frequently have to be analyzed in combinations. Here are some common examples:

1. Stalls both in power and glide. Probably due to too much incidence. However, be sure that the glide stalls were not the direct result of a complete stall that resulted when the engine died with the plane in a normal-climb nose high condition. It is safe to remove 1/16" incidence at a time from the wing; but only 1/32" at a time from the tail (though the tail is not concerned in this case).

2. Mushy or stally climb followed by fast glide. Ship needs more incidence; engine more downthrust. If the glide is not dangerously fast, correct the thrust first and observe the result. Whereas combinations are involved, it is better to make single corrections and establish clear-cut effects.

3. Straight power flight, but banked glide. The rudder must be moved with its neutral position actually killing the turn tendency. This, of course, will make the power flight bank in the other direction, and thrust corrections will have to be made accordingly. In this case it would be safe to anticipate the power turn by making a slight thrust offset beforehand.

4. Straight glide but banked power flight. Lucky you! Add engine offset to straighten out power flight.

5. Good glide but mushy or stally climb. Assuming straight flight, add downthrust. If turn is involved, remove it first, for removal of a turn tends to make a ship more stally on straight flight.

6. Fast power flight but slow glide. Too much downthrust. After removing downthrust and checking results, the glide should be corrected separately.

Keep in mind that straight flight is a matter of obtaining straight glide first; then straight power flight by means of offset thrust. Reasonably straight power flight is obtained in the same rough kind of way that a sculptor chisels out a statue. It is not vital that flight be arrow true at this stage; very moderate departures from the straight can still be permitted. The aim is to arrive at the radio stage with a ship that can respond well enough to give you control over the whole flight. Turning tendencies in one direction always built up control response on one side, and weaken it on the other. As a beginner, you can be rattled out of control by an unexpected spin. Okay, you recover it by using opposite rudder. So there is the ship, stalled nose high on recovery 15' off the ground. We've done it!

Now, the plane is approximately adjusted and you are ready for radio control. If you had been experienced, this flying might have been assisted with the radio in place, though this is tricky with a new, original design. In your case, the radio is put in and the simulated radio ballast removed. What do you do now?

In the writer's experience an engine run of 30 secs. is good for first R.C. tests. If the open area is really large, 45 secs. is better because you can wait longer before initial use of the rudder. While the experienced man might use rudder close to the ground —since he can react more quickly and do the proper thing if something goes wrong —it is better to wait until the ship is out about 15-20 secs. before trying rudder. Most often, the flier leaves his rudder in neutral with the right-rudder position coming up on first use of the button.

The kind of response you might get depends entirely on the amount of rudder area, its degree of movement, the speed of the plane, and even the amount of slipstream, which depends on the prop. A plane with mild response may come on around a full turn without losing altitude, while one with extreme response will flip over and be in a power spiral in less than half a turn. If the plane is being flown with too much throttle, this wind-in can occur as quickly as a thunderclap. This is particularly true of new designs being tested for the first time; in the case of the *Citizen*, one-third of the original rudder area was removed and about half its movement was eliminated, therefore it is very unlikely that anything dangerous will result.

So, you press the transmitter button. The ship begins to turn to the right. What you can do now depends on how much cleared area you have. You can press the button immediately to get back to neutral, then tentatively try a very short turn to the left, etc., until power dies. You probably won't put the ship down anywhere nearby. If you have only a small cleared area, leave the plane in the turn until you see it is beginning to head back toward you (unless it begins to dive), then press the button once to get back in neutral. The ship may not fly exactly straight—for your adjustments are perfected from here on over many dozens of flights—so anticipate the unexpected. The plane probably will begin a mild turn on its own. Remember that the rudder is in neutral with left rudder next. If the ship begins to turn to the left, you can't keep left rudder on, so you have to send your rudder quickly through left, back through neutral, then to the right. If the ship turns right, your rudder can go to the next position which is left. To tell you what to do all through a mythical flight is impossible, but the above is the typical beginning.

Now we'll let you in on something. After many months of R.C. flying, during which there always was a terrible feeling of panic and desperation when the sequence slipped in our "think box," we caught wise to the fact that the plane could be flown without attention to sequence, in an emergency. You can never make a mistake by pressing the button once. For example, suppose the plane being tested flips over in the bank and begins to wind down. Press the button once and the neutral rudder will permit a gradual recovery. If that isn't enough, press it again and the ship will come round and climb. If the plane is flying straight and you don't know which way it will turn, and you fear doing anything, press the button. It will begin to turn. You'll always know that after a turn, neutral is next. Any time the sequence is forgotten fool around 'til the plane goes straight, then press the button to see which way the next turn goes and you are in business again. The cure, actually, is a forced relaxation. In all emergencies now, we follow the do-anything school of thought.

Make at least a dozen of those short 30- and 45-second power flights, getting the feel of things, building up confidence. One minute under power is a long time in the air, and 2-1/2 min. is a century to the "intermediate" pilot. Five minutes is king size and only the adventurous or the practiced venture on for 10 and 15 min. Properly adjusted and flown on low power, the *Citizen* will gain about 50' of altitude a minute. When its tank empties it will be at least 350' in the air.

Something they don't warn you about is the strategy of each flight which begins to cook as soon as the ship is airborne. You will find yourself wondering at all times how to keep the plane near you; how to get it back from wherever the engine dies; how to keep it headed into the wind, if any, without striking obstacles by falling short or overshooting. These short flights will give you that sense and, at the same time, will permit final adjustments to get a straight-as-a-die glide, straight power, moderate climb, and the correct control response. You may decide later to increase or decrease rudder effect. Trimmed and equipped as described the *Citizen* will not spin, but will spiral in tight circles; even in full rudder in the glide going through several turns of a spiral, it will not hit

steeply enough to smash the plane. It will cartwheel but the wing surfaces detach; and it is doubtful if damage will result. The original has spiraled into woods, fences, and bare ground with little damage. Rudder effect is increased by bending down the wire arm attached to the rudder where it enters the linkage. Do not exceed the eight o'clock position on the ignition spark arm unless the ship refuses to climb as built, or because of a worn engine.

No one can teach you how to fly radio control. It is suggested that you get a friend to help you indoors with a pre-flight routine some evening. You take the transmitter and with your eyes shut try to control the plane as he describes its maneuvers. Have him call a maneuver to you, then as he sees the rudder move he can pick up your errors or go on to say what the machine probably is doing as a result; then you struggle with that situation. We spent our first evening after the ship was finished doing this (and once spun into the kitchen floor!)

It is from the out-of-control flights that experience can be passed on. All our out-of-control flights — which have averaged about a mile — have occurred because of faults in adjustments and very infrequently due to malfunctioning in the model.

After our first three successful 30-second motor run flights, the timer was set for four minutes on our first R.C. airplane. In the enthusiasm, the engine timer probably was advanced. Anyway, the ship climbed in tight left circles and made a beautiful duration flight as a free flight job. What had we done? First, we had varied the power drastically—when the success of this kind of flying depends on not varying *anything* unless adjustments dictate it. Second, we had not waited until we had had adequate experience. It looked so simple. The engine run was long enough for an expert. Excess climb, resulting from the slow trim of the plane for that power, made it impossible for the rudder to get the plane out of a left turn in the climb. This happened on two other occasions before we even realized that the radio wasn't failing, as we had supposed!

After we had progressed to being able to steer the ship around a pattern without losing it on a windy day, an out-of-control flight occurred with shocking suddenness. The plane was gliding across wind, from which position we attempted to turn it upwind for the approach and landing. The rudder was applied but nothing happened. After the plane continued straight across wind for about 100', it was assumed that a mistake had been made in sequence. Gliding straight—the rudder must be neutral! So we gave it one rudder pulse to come over to what we thought would be left rudder, and the plane instantly banked the opposite way and sped down wind like a bullet out of a gun. It was a quarter mile away before we remembered to do anything, pressed the button once, and the ship headed back for an "in-sight" landing.

In a wind, more rudder action is required. Even with sufficient rudder area there can be a delay of many seconds before a plane will turn from cross wind into the wind. Not realizing this, we had called for left rudder, when actually it was already in left, so that the control surface then went to neutral. This was not enough to hold the plane cross wind and it turned away. When we pressed the button with the ship a quarter mile out, the rudder went to right and she headed back.

Winds are dangerous. Not only do they pick up as the model ascends—we had that happen with no wind on the ground after the wind died at sunset—but a ship can do strange things in the wind. For instance, a turn under power into the wind may be half completed when the engine dies. The plane is apt then to whip off in a wild down-wind turn in the opposite direction. Once we passed between trees, under wires, hit in a road and bounced over a fence—and the plane had been only seconds from safety. *Stay out of the wind.* Any sequence difficulties or missed signals at altitude in a wind may get the plane so far down wind that you have trouble telling what it is doing. You have to see a plane clearly to tell what it is really doing on every signal.

Keep it up wind if possible and spin or spiral down whenever altitude gets excessive.

Virtually all our lost flights resulted from poor turn adjustment or poor longitudinal trim. You must have rather flat power flights with gradual climb, and altitude increasing slowly because of time in the air. The typical free flight adjuster is apt to try a climb at too high a nose angle. The ship gets too high, is hard to see clearly, and it may "stick" in a left climbing turn, due to inability of the rudder to overcome torque at the low flight speed. We muffed many flights before catching on to this. Poor turn adjustment, with a strong turn to one side and a weak turn to the other is too often accepted until some wind is encountered. Then it becomes impossible to hold the plane into the wind and the ship gets further away on every circle. The strong turn will whip it around quickly into the wind but the opposite rudder proves too weak to keep the heading and eventually the plane begins another turn. Make it a habit to observe the kind of turns you are getting on every flight. Note: if the ship is flying straight in neutral, and if it glides straight. Begin to worry any time the model seems sluggish in coming around to one side or the other. That's a built-in out-of-control flight waiting to happen.

One fault in our *Citizen*—not necessary in yours—is a slight bit of whip in the rudder linkage. This is due to too much play in the parts. As a result, the plane has the odd characteristic of stopping its rudder at different places for neutral, depending on which way the rudder was last moved. The plane holds neutral when right rudder is coming up, but when left rudder is next, the "neutral" position permits a barely perceptible turn away from straight toward the left.

* * *

In one important respect the design of a radio control model closely resembles full scale. While an R.C. ship will perform well,

it is always possible with time to make further improvements in maneuvering characteristics so that the model undergoes continual refinements. Conversely, after some 75 or 100 flights, shortcomings of any particular design are revealed. Because radio models will come into their own before long the writer would like to pass along the results of further experiments with the *Citizen*.

It has been found that the ideal power plant for easy handling is an .099, rather than a .199. It was also discovered that, whereas the .099 failed to produce climb on a flat pitch prop at high revs, it is capable of forcing zooms, and stalls and steady climb to about 500′ over 5 to 7 min. of flying (which is more than enough) when equipped with a *Tornado Sport* 9-4 propeller. *Power Mist* is being used in a rather small *Anyway* stunt tank set on edge and giving about a five- to six-minute engine run. An *Austin* timer and fuel shut-off has been attached to the firewall beneath the engine.

Removal of coil and battery, etc., has resulted in startling changes. First, due to nose light trim, all the packing for incidence has been removed (about 3/16″) and 1/16″ negative has been removed from the stab. The over-all drag is thus greatly reduced permitting the smaller engine to do a most satisfactory job. The .099, due to higher rpm requires double the right thrust shown for the .199 and, due to less power, requires almost double the downthrust of the .199. The rudder has been reduced to ⅞″ width at the base, and has about ¼″ movement to right and left.

Since the ship tends to overbank in the turns (from the standpoint of the ideal contest machine)—without, at the same time, spiralling tightly—this overbanking and dive in a 180 to 360° turn always followed by a slight zoom on recovery, is the result of the profile of the fuselage and could be improved by raising the rear of the fuselage with the stab about 2″ higher than at present; by lengthening the moment arm to one-half span. Also, while the *Citizen* flies well in the wind its ability to glide straight into the wind from far out might be improved. This will result from a longer moment arm and the addition of vertical tail area, up to 15% total of the wing area.

Present loadings with the .099 have worked out to 16½ oz. for the wing per square foot and 565 power loading. The machine is ideal now from the point of view of power and its glide is as slow as one dares use without risking thermals (due to the thick Gottingen section). With *Aerotrol*, or any equipment using light batteries, these loadings will be sizeably reduced. *Rudevator* would produce perfect turns without design changes.

These things usually remain designers secrets but to further R.C. design, the writer would like to suggest that twin rudders placed outside the slipstream, but well above the ground, would cut down on annoying differences (on most models) in rudder action between power-on and power-off. For automatic take-offs, a trike gear with plenty of shock absorbing action on the nose wheel would be desirable. Lastly, a number of radio control fliers have found that the addition of a belly fin has corrected bad banking tendencies. This indicates the desirability of low bellied designs in keeping with the CLA theory. While CLA is unimportant in contest free flights it is vital where smooth turns and banks are required.

Reliable Escapements

(*Continued from page 23*)

thick, as this will provide more material for forging the lugs with a peening hammer. Three drills are needed; a #59, a #43, and a #50 for the #2-56 tap. When drilling the pivot holes make sure they are aligned perfectly.

ITEM 4. Finding a suitable aluminum alloy for this part is the biggest snag. Aluminum and its alloys, as you probably know, have characteristics ranging all the way from a lead-like softness to the hardness and strength of mild steel. You could tie a ½″

rod of 1-SO into a knot with ease, but even Charles Atlas might be excused if he perspired gently as he did the same to a piece of 75-S. Well! that is by the way. The ideal alloy is 3-S½H. It will take a sharp bend without cracking and is strong enough to remain rigid after forming. Going to the scrap bin again, several alloys may be found. As they will hardly be marked, the best thing is to test them by making sharp bends and feeling for rigidity. The "strong alloys" 17ST or 24ST, sometimes known as *duraluminum*, will not take sharp bends without cracking. If that is all that can be obtained, make the bends with generous radii and allow for this when cutting the blank.

ITEM 5. I must warn you that I am almost completely ignorant on electrical matters. The coil detailed on the drawing may certainly not be the best possible. I can only say that of the more than fifty I have wound with various sizes of wire, more or less turns, and different core sizes, this was best. I didn't have a suitable piece of soft iron for the core so I used a 6" nail instead. The nail was thrust into a glowing heap of coals in the furnace and left there overnight to cool. In the morning it was removed from the ashes, in its softest state I am sure. A portion of the nail was chucked in a hand drill, which was clamped in a vise, and turned down to specifications with files. The end of the core was drilled and tapped with a #2-56 thread. The fiber discs were a tight fit on the core.

To wind the coil; the discs were slipped onto the core, a #2-56 machine screw, with the head cut off, was used as the shank to be chucked in a hand drill. With the drill clamped in a vise, 150 turns of #26 enamelled copper wire were carefully wound in place.

ITEM 6. This was made from .01" control line wire and needs no explanation. Just be sure that coiled portion fits loosely over the armature pivot.

ASSEMBLY. Mount wheel (1) and bracket (3) on the base (4). Using ITEM 3 as a guide, drill through the base for the armature pivot. The pivot should just protrude through the back of the base in order to assure a rigidly held relationship between shaft and pivot centers. Mount pallet and coil. Get out the M.A.N. with Part 1 of these notes and start adjusting. The finished escapement should give you precise and trouble-free service. I rather believe an occasional inspection; touching up for wear, and lubricating the shaft bearings and pivot holes, etc., is desirable. Pallets and escape teeth, should be lubricated very sparingly, if at all, and then only with a light smear of sewing machine oil.

I do hope you like this escapement and get as much fun out of making it as I did.

Flash

(*Continued from page* 5)

ubiquitous T-6 of World War II fame. The T-28 has a top speed of 292 mph. and a ceiling of 31,650', which is the kind of performance we accepted as tops for pre-World War II fighters (Curtiss P-36, Republic P-35, etc.). Air Force will also buy 12 additional Convair T-29 navigational trainers. These are military versions of the well-known Convair *Liner* equipped with seats for 14 student navigators and 4 instructors.

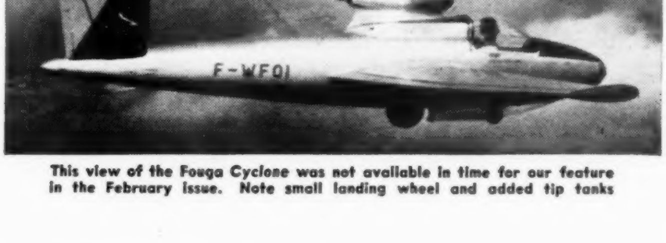
HEAVY-DUTY transports fill the list of the Air Force this time with orders for 36 more Douglas C-124, 14 more Boeing C-97 and 53 more Fairchild C-119 transports. The Douglas *Globemaster II* (to distinguish it from the famed C-74 *Globemaster*) recently made its first test flight and can carry a 50,000-lb. payload! The C-97 is the well-known Boeing *Stratocruiser* of which 40 have already been ordered by the USAF. Boeing is nearing the end of its production line of 55 commercial *Stratocruisers* and the new Air Force order will keep the big four-engined jobs coming for at least two more years. The C-119 is the twin-boom Fairchild *Packet* but powered by two huge Pratt & Whitney R-4360 *Wasp Major* engines.

ONE LONE additional order for a type not duplicated anywhere else is 11 Grumman SA-16 air rescue amphibians, 32 of which have previously been ordered by the Air Force. The Grumman *Albatross* can carry 16 litters (a complete heavy bomber crew) after a rough-water take-off back to base at 225 mph. Air Force has standardized on this big amphibian and the new order brings to 63 the total number requested.

IT IS IMPORTANT to remember that the program outlined above is not yet fixed and the final numbers of each type must await the outcome of the Senior Officer's Board meeting. The plan has wandered all over the lot from a total of 1,335 aircraft under the Truman 48-Group program down to 815 aircraft under Secretary Johnson's proposed cut and back up to its present 1,070 aircraft total. Where it will go from here, nobody knows. As for Naval Aviation procurement, nobody knows at this writing, since Johnson has asked the Navy to make deep cuts in its operation and the Navy plane-buying program is geared closely to the number of aircraft carriers it will be operating, which is determined by the number of task groups, allowable personnel ceilings, etc., etc.

IT NOW seems certain that the De Havilland *Comet* jet air liner is going to see service in America! (Remember—America extends all the way from the North to the South Pole!) Canadian Pacific Airlines has ordered two *Comets* for use on its Vancouver-Tokyo route. Scheduled for delivery late in 1951, the sleek liners will cruise at 40,000' at 500 mph, making the Vancouver-Tokyo run in 10 hrs., the Tokyo-Vancouver trip in eight! Meanwhile, BOAC is planning an elaborate flight test program with the new jet liner before deciding whether or not to place it on its trans-Atlantic route. U.S. air lines had better get busy!

THE WORLD'S most powerful propeller-driven engine has been announced by the Allison Division, General Motors. The new Allison T-40 develops the astonishing output of 5,500 hp and is slated for instal-



This view of the Fouga Cyclone was not available in time for our feature in the February issue. Note small landing wheel and added tip tanks

lation in the Convair XP5Y-1 flying boat. With four of these giant engines installed, the new Navy flying boat will be the most powerful aircraft in the world (it's 22,000 hp just noses out the 21,000 hp of the Convair B-36 bomber!). The T-40 is actually two separate gas turbine engines linked together through gearing at the nose to drive a single propeller installation (although counter-rotating propellers will be used). The T-40 is made up of two Allison T-38 units, each rated at 2,750 hp. The T-38 is being installed in the Douglas XA2D-1 Navy carrier-based attack plane and plans are well along for its installation in the Convair *Liner* and the Martin *2-0-2* commercial airliners.

WE MAY YET see the huge Lockheed *Constitution* in commercial service. You will recall the Navy purchased two XR60-1 transports from Lockheed but now finds them uneconomical to operate, not because of any lack of efficiency of the airplanes but because of the peculiarities of the Navy Fleet Logistics Support Wing in which the two aircraft were operated. As a result, the Navy has requested air lines to submit bids for a 5-year lease of the two 92-ton monsters, which are powered by four Pratt & Whitney *Wasp Major* engines but which were designed for turboprop engines. Originally slated for Pan American Airways, passenger versions of the plane could carry 180 persons in comfort at what Hall Hibbard, Lockheed Vice President-Engineering, calls "the lowest cost per ton-mile of any plane ever built." Only problem of an air line is obtaining CAA certification of the huge planes, but Lockheed believes this would be easy since they were originally built to CAA requirements. If no air line claims the two big ships they will go to the Litchfield Park, Ariz., "boneyard" for surplus military aircraft.

BEHIND THE SCENES the U.S. Air Force is pushing in-flight refueling for all it's worth. Following successful non-stop round-the-world flight of the Boeing B-50 *Lucky Lady*, which used the British-developed Flight Refueling, Ltd. system, Air Force and Boeing developed a new rigid-line system for use in refueling B-29 and B-50 bombers through the nose. News of the successful in-flight refueling of a British Gloster *Meteor* resulted in the USAF rushing a Republic F-84 *Thunderjet* fighter across the Atlantic to Flight Refueling's Tarrant, Rushton Base. The F-84 has been successfully refueled in flight by taking aboard fuel into its wing-tip tanks (since its nose contains an air intake, unlike that of the *Meteor*). Air Force is convinced that in-flight refueling is the answer to long-range bombardment problems together with those of the jet aircraft and is going ahead full-speed in a variety of developments along this line.

WHAT IS probably the world's first double-deck helicopter, the Sikorsky XH-19 has made numerous successful test flights. The new design features a large cargo compartment with two-man crew quarters located above. The engine is mounted in the nose and the rotor above the crew compartment. Developed by the Air Force for rescue/cargo/passenger utility, the new Sikorsky weighs about 7,000 lbs. fully loaded and has a useful load of about 2,800 lbs. It is powered by a 600-hp. Pratt & Whitney R-1340 Wasp engine. The engine is covered by large clam-shell doors in the nose that greatly simplify maintenance problems. Air Force has ordered five of the new type and Sikorsky is distributing studies of a commercial passenger version.

IT LOOKS AT this writing that one of the biggest air line mergers in U.S. history may come off at long last. A Civil Aeronautics Board examiner has recommended C.A.B. approval of the purchase of American Overseas Airlines (now owned by American Airlines) by Pan American Airways for $17,450,000 *cash*. The C.A.B. has opposed the merger for more than a year because of its competitive effect on trans-Atlantic operations. TWA, only other trans-Atlantic operator, bitterly opposes the merger. Unlike most United States air lines AOA has consistently shown a profit since its acquisition by American from American Export Lines shipping company.

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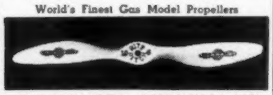

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☐ 9"—6	.35	☐ 12"—10	.35
☐ 9"—8	.35	☐ 12"—12	.35
☐ 9"—10	.35	☐ 13"—6	.35
☐ 9"—12	.35	☐ 13"—8	.35
☐ 10"—6	.35	☐ 13"—10	.35
☐ 10"—8	.35	☐ 13"—12	.35
☐ 10"—10	.35	☐ 14"—6	.35
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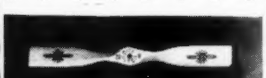

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☐ 11"—8	.35
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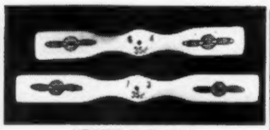
☐ 14"—8	.35



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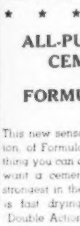

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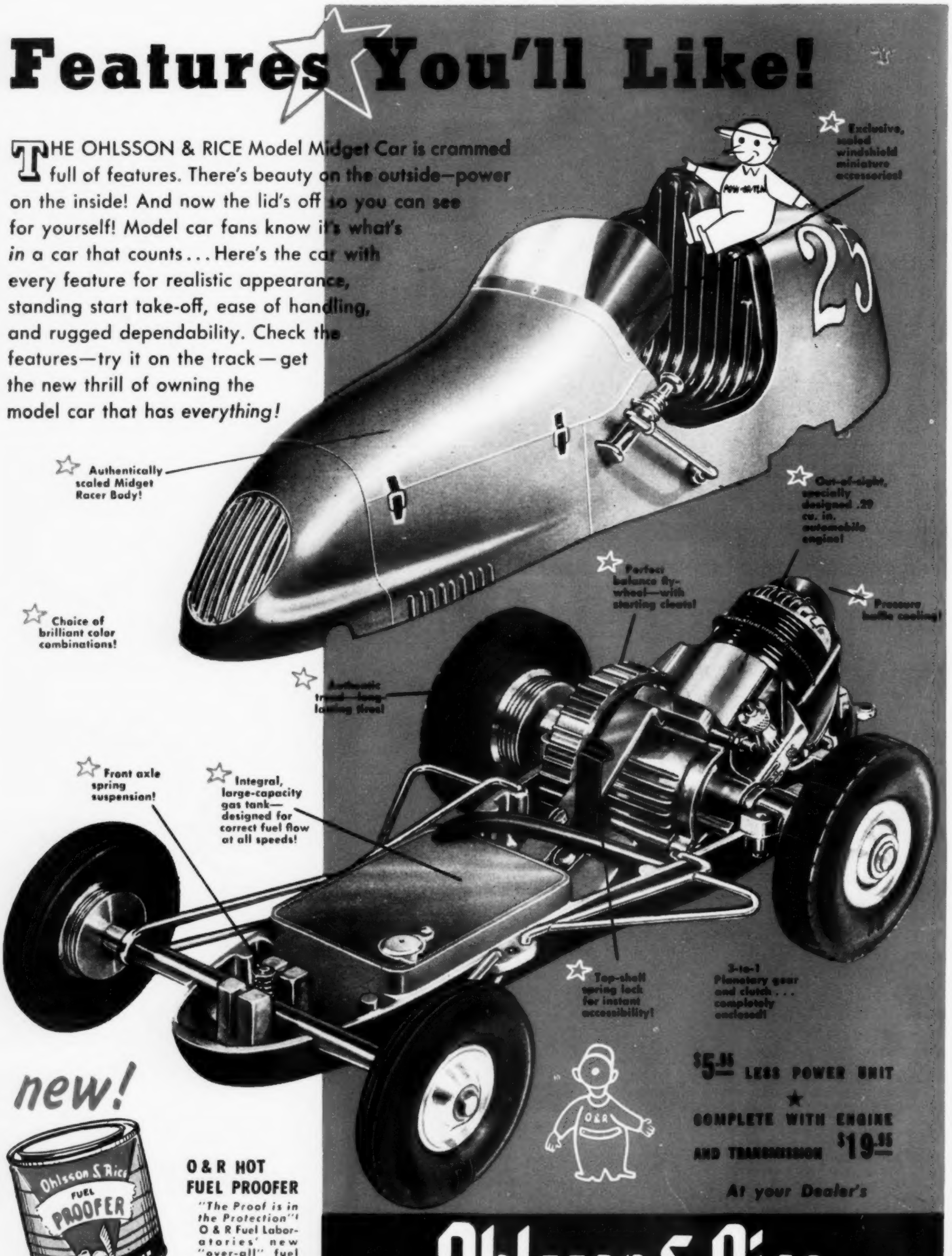

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